United States
Environmental Protection
Agency

Solid Waste
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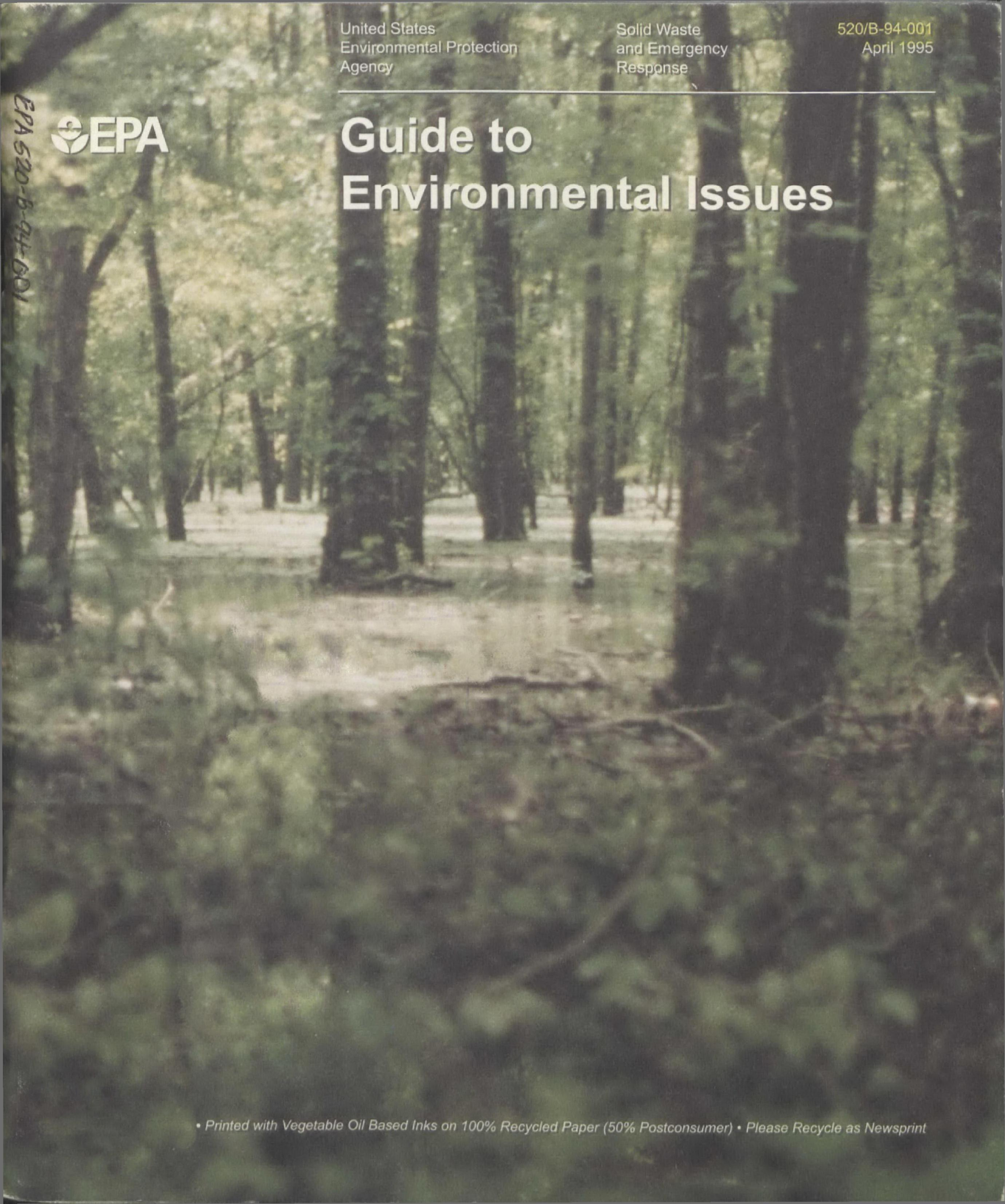
Guide to Environmental Issues



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Guide to Environmental Issues

Earth Day 25 Edition
April 22, 1995

Office of Solid Waste &
Emergency Response

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Cover photo: Bottomland Hardwoods, Yazoo National Wildlife Refuge, Mississippi, courtesy U.S. Fish & Wildlife Service.

This ***Guide To Environmental Issues*** was based in concept and format on *Citizens' Guide for Environmental Issues - A Handbook for Cultivating Dialogue* by the National Institute for Chemical Studies and U.S. EPA, 1989 and 1990.

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Note: **Bold face** terms used throughout are defined in the Glossary, Laws Section, or Government Agencies Section.

information sources

Although protective laws respond to public needs, we need to understand how laws and regulations work in real situations. Knowing where to turn for help is sometimes as difficult as understanding which issues are addressed by specific environmental laws.

introduction

By choosing to read this Guide, you are showing your concern for the environment. Many of our daily activities can potentially alter environmental balances, but too often we ignore relationships among people, other living creatures, and our surroundings.

Environmental protection can be most effective when complex connections between all parts of an **ecosystem** and society are taken into account. No longer can we say, *"I'm too busy to be concerned with the environment—someone else can take care of it."*

citizen participation

That someone is you. Citizen participation is a key element in environmental protection. This Guide is dedicated to the enthusiastic interest and creative ideas of people across the country who are concerned about the nation's environmental health. Diverse elements of everyday life make each contribution unique. The abilities and vision of a multitude of people need to be applied to the public decision-making process.

This handbook lists federal and state agencies as well as pertinent health, safety, and environmental laws, with brief comments on each law's intent.

the terminology problem

Discussing complex economic, technical, health, safety, and environmental issues can be frustrating. Many environmental conversations evolve into a series of acronyms, technical terms, and jargon that can leave you confused unless you have been previously involved with the issues. When words or phrases remain undefined, dialogue is likely to be limited. With *Guide to the EPA*, we try to make environmental concepts clear to all so that language and limited access to information do not hinder public participation.

When you see a term in **bold**, that word is defined in the Glossary in the back or may refer to a specific Law or Government Agency. We included terms and definitions relating to **pollution prevention**, enforcement, regulations,

community involvement, and environmental **risk.** We also included a variety of technical terms and acronyms frequently used by subject matter specialists.

Please note that many terms in the text and glossary may have different meanings for different audiences. Definitions and explanations presented here provide only a general understanding of the terminology and should not be taken as full technical or legal definitions. Although much more could be said about any topic, the information provides the basics in non-bureaucratic English. We hope this Guide helps you become actively involved in community dialogue and better able to understand environmental issues.

where do I get help?

Have you ever wondered where to turn for answers to environmental problems? If so, you are not alone. In the back of this Guide we have listed four pages of EPA and federal agency telephone numbers and addresses, followed by two pages of **Hotlines** that EPA maintains for general and specific information. But protection of the environment is a big job. Federal, state, and local agencies across the nation are all involved, employing thousands of citizens who care about their health and natural resources. Every city, county, and state networks with federal groups to share and provide information. If the first person you contact can't answer a specific question, he or she will know who can.

Civic and community organizations are usually helpful too. Chances are, if you contact one group that is not involved with a particular topic, you will be steered to the correct organization. In some areas, environmental and other community groups have formed coalitions for improved communications and action on specific issues.

The literally thousands of trade and citizen groups involved in environmental issues are far too numerous to list. Your local telephone Yellow Pages contains a directory of many groups and their respective telephone numbers. You should contact those groups whose interests are similar to yours.

substitute raw materials, and make improvements in management techniques, training, and inventory control.

Here's one example. The **U.S. Environmental Protection Agency (EPA)** is responsible for protecting people and the environment from **risks** associated with all sorts of toxic chemicals.

pollution prevention

One of the most encouraging environmental developments of recent years is the trend toward preventing — and not just treating — **pollution.** For example, scientists have found various ways to treat wastes in order to protect the environment. Now, there is growing realization that whenever possible, avoiding wastes altogether is even better.

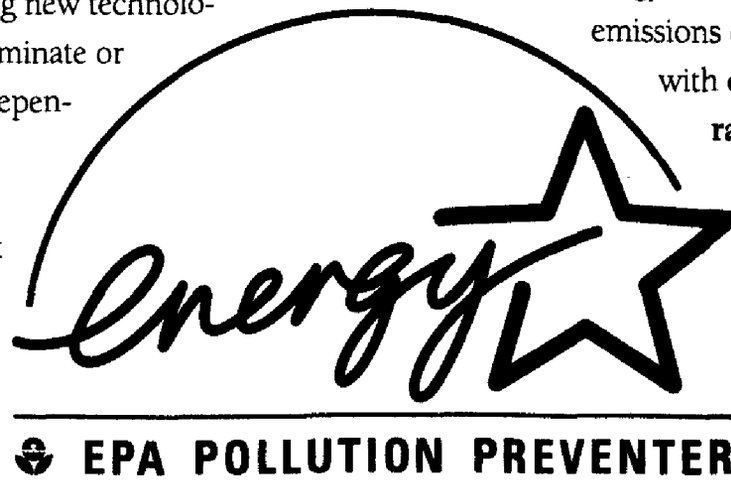
On a broad level, passage of several laws relating to the environment helped create a climate of change. **The Clean Air Act (CAA)** in 1970 and the **Clean Water Act (CWA)** in 1972 signalled our nation's intent to address **pollution.** Many activities and programs have followed these Acts to limit further the amounts of allowable **discharges** into the environment. We now recognize that end-of-pipe technology offers only a partial solution and fails to completely protect the environment.

The **Pollution Prevention Act of 1990** takes a new approach. To avoid pollution in the first place, manufacturers are encouraged to modify equipment and processes, redesign products,

One of the best ways to accomplish this is through **pollution prevention**. Before a new chemical is marketed, EPA reviews the ingredients and intended uses to determine potential health or environmental hazards. During the review, EPA identifies measures aimed at reducing exposures to the chemical. At this early stage, companies wanting to manufacture or use the chemical can readily integrate pollution prevention measures into their plans. If such measures will not reduce potential risks, EPA can regulate the chemical in several other ways.

EPA also reviews chemicals already in production. The **Toxic Substances Control Act (TSCA)** Inventory lists about 70,000 existing chemicals. Of greatest concern are 10,000 to 14,000 high-volume chemicals for which little or no data exist. To address this large number of chemicals, EPA systematically reviews clusters of related chemicals and ranks them for further review or testing. Nominations of candidates for screening come from a variety of sources, including a federal interagency testing committee of experts.

Pollution prevention also involves waste **minimization — recycling** what we used to throw away or not generating wastes in the first place. Many companies now are cleaning up solvents for re-use or changing the industrial process to more efficiently use raw materials. Likewise, scientists are developing new technologies every year to eliminate or greatly reduce our dependence on **toxic substances**. A simple example is using hot water and soap instead of organic solvents to clean equipment.



Preventing pollution can save money in a variety of ways, and so EPA has designed several non-regulatory, innovative pollution prevention programs. Corporations, environmental groups, electric utilities, and state, city, and local governments participate voluntarily in the following:

The "33/50" Program focuses on reducing overall **risk** from 17 high-priority toxic chemicals. The name derives from voluntary performance goals: participating companies pledged to reduce **emissions** and transfers of these chemicals by 33% in 1992 and 50% by 1995. The 1992 goals were surpassed a year ahead of schedule — more than 486 million pounds of reductions were achieved, due to conscientious business practices.

Through the "Design for the Environment" Program, EPA is working with specific industries to find chemical substitutes and **exposure** reduction techniques. The printing and drycleaning industries are currently piloting a voluntary shift toward using more environmentally safe chemicals and technologies. More information is available at 202/260-1821.

Six "Energy STAR" programs seek to prevent emissions of air pollutants associated with **climate change** and **acid rain**, while promoting profitable investments in energy-efficient technologies. Information about all "Energy STAR" programs is available from 202/233-9659. You can request specific documents to be mailed or sent by facsimile. A handy set of directions walks you through program selections on your telephone.

In a nutshell, the "Green Lights" program encourages the widespread use of energy-saving light bulbs and fluorescent tubes. "Green Lights" participants are already avoiding over 95 million kilowatts annually — that equals $9.4 million in avoided electricity costs.

The "Energy STAR Buildings" program is a partnership effort with business to promote energy efficiency in commercial buildings. The program starts with membership in "Green Lights," followed by a comprehensive building survey and tune-up. The program then engineers increased efficiency in heating, ventilation, and air conditioning loads and improved fans and air-handling systems.

"Energy STAR Computers" is another partnership with leading U.S. manufacturers to save additional energy costs. Desktop computers, monitors, and printers can "sleep" or "power down" when not in use, cutting electricity use by over one-half. The federal government, the largest user of computer equipment in the world, will buy only energy-efficient computers in the future.

The "Ag STAR" Program focuses on animal waste methane which is emitted to the air when manures ferment. Such emissions waste a usable energy supply, produce odors, and contribute to **climate change**. This innovative program recovers methane gas from swine and dairy manure for re-use by the farmer.

The "Natural Gas STAR" program is another methane recovery project aimed at oil and natural gas pipeline leakages and system inefficiencies. EPA is working with public utility commissions to reform rate structures to include incentives for efficiency gains, cost reductions, and methane emissions reductions.

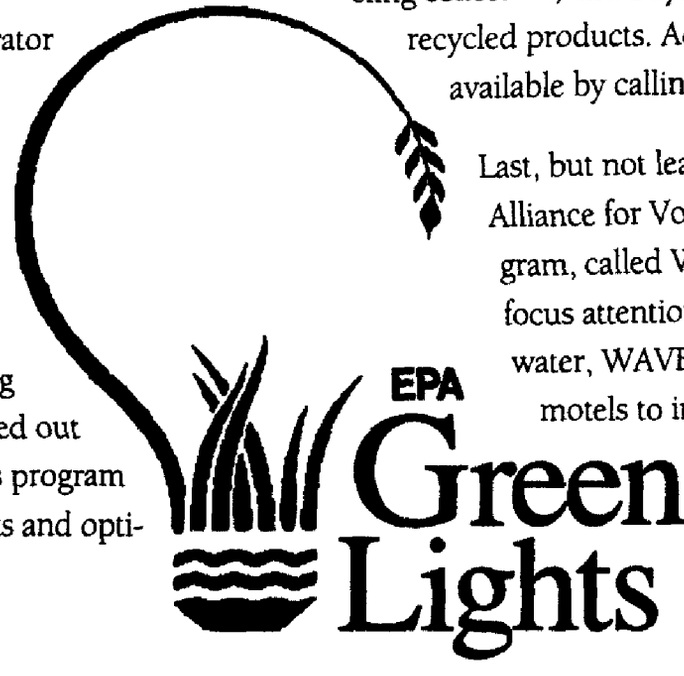
The "Super Efficient Refrigerator Program" seeks to produce energy-wise appliances for home and commercial use. **Chlorofluorocarbons (CFCs)**, chemicals used in refrigerators for cooling and freezing, are **ozone**-depleting substances that will be phased out of production by 1995. This program is finding alternative coolants and optimizing energy efficiency through better compressors, door seals, and insulation.

In addition, EPA has many other new voluntary programs, some just getting off the ground, but these three top the list:

The "Climate-Wise" Program challenges organizations from all sectors of the economy to find creative ways to limit or reduce greenhouse gas emissions (see **climate change** in the Glossary). Such actions may include raw material substitution, process improvements, and switching to lower-carbon-content fuels. Other initiatives put into place employee's good ideas: planting more trees, grasses, and plants to absorb excess carbon dioxide from the air, carpooling, and installing corporate-wide efforts to recycle and reduce waste. For more information, call 202/260-4407.

The "Waste-Wise" Program is a public-private partnership designed to assist businesses in reducing their solid waste. Businesses set their own goals and commit to achievements in the following three areas: waste prevention, recycling collection, and buying or manufacturing recycled products. Additional information is available by calling 800/ EPA-WISE.

Last, but not least, is the "Water Alliance for Voluntary Efficiency" Program, called WAVE. Designed to focus attention on efficient use of water, WAVE encourages hotels and motels to install water-saving



devices. Use of low-flush toilets, and low-flow shower heads, dishwashers, and laundry equipment, as well as **recycling** wastewater, is both profitable and practical. The payback period for most projects is three years or less. This program will be expanded to more businesses, institutions, and local governments. For more information, call 202/260-7288.

The same basic pollution prevention ideas can be used in the home. Each of us can use energy efficient or recyclable products and decrease our volume of waste. Contact agencies listed in the Directory of this Guide for things you can do to prevent pollution. In addition, bookstores and libraries typically contain information that can help you and your family dramatically reduce — and in some cases eliminate altogether — everyday sources of pollution. As our awareness grows and we begin to realize the full health and environmental effects our actions have, pollution prevention becomes increasingly attractive.

some questions & answers on pollution prevention

Q. *How does pollution prevention work?*

A. Here's an example. If a chemical has been identified as toxic to the environment and a less harmful substance is used instead, pollution may be prevented. By the same token, your conscientious selection of products for the home can prevent pollution.

Q. *Why wasn't pollution prevention started sooner?*

A. During the industrial revolution, few people envisioned what an enormous collective effect we would have on the global environment. We chose first to treat the obvious effects of pollution, not the sources.

Q. *What are some specific ways I can personally prevent pollution?*

A. Look for goods with less packaging; use longer-lasting, full-spectrum fluorescent tubes that require only a fraction of the energy of incandescent bulbs; reduce your use of hazardous household products; recycle glass, paper, plastic, cardboard, and other materials. Many other ideas are available from EPA, environmental groups, and trade associations.

Q. *Where can I get more information on pollution prevention?*

A. Call EPA's Pollution Prevention Office at 202/260-1023. Many states also have pollution prevention offices with information available to the public.

address these and other chronic air quality problems.

These Amendments signal a change from past pollution control approaches. Innovations in this law include programs based on cooperation between government and industry, and

air & radiation

Perhaps more than anything else, air interacts directly and constantly with us. All land creatures breathe gases and materials suspended in the air. By the same token, trees, grasses and other plant species carpeting the earth are equally dependent on clean air. We all have a stake in the quality of our air.

Outdoor air quality is affected by many human and natural activities. Manufacturing companies, power plants, small businesses, automobiles, forest fires, and volcanoes are all sources of air pollution. Any activity that releases materials into the air affects air quality.

Although the landmark 1970 **Clean Air Act (CAA)** prompted large improvements in air quality, not all of Congress' goals have been met. Emissions of pollutants such as sulfur oxides, **volatile organic compounds (VOCs)**, carbon monoxide, particulates, and lead have been greatly reduced. But much work remains to effectively reduce acid rain, **smog**, and air toxics associated with increased cancer risk and other health complaints. The 1990 CAA Amendments were intended to **pollution prevention** incentives based on market forces. The goal of the entire Act is to reduce air pollution by 56 billion pounds per year. These reductions are expected to come from cutting **emissions** from several major as well as many minor sources.

Urban pollution also is addressed under the 1990 CAA Amendments. Cities that fail to meet standards for human health must comply with the standards by deadlines set in the law. In many urban areas, ground level **ozone** persists in **concentrations** harmful to human health. Large sources of pollutants (such as nitrogen oxides) that contribute to this problem and smaller sources of **hydrocarbons** must reduce emissions. In some cities, this requires vehicle emissions testing, **vapor recovery systems** at gas stations, and other controls on smaller sources of pollution.

Carbon monoxide problems in **non-attainment** areas are addressed in a similar fashion. Areas with the worst carbon monoxide problems are required to use special forms of gasoline known as oxyfuels during winter months.

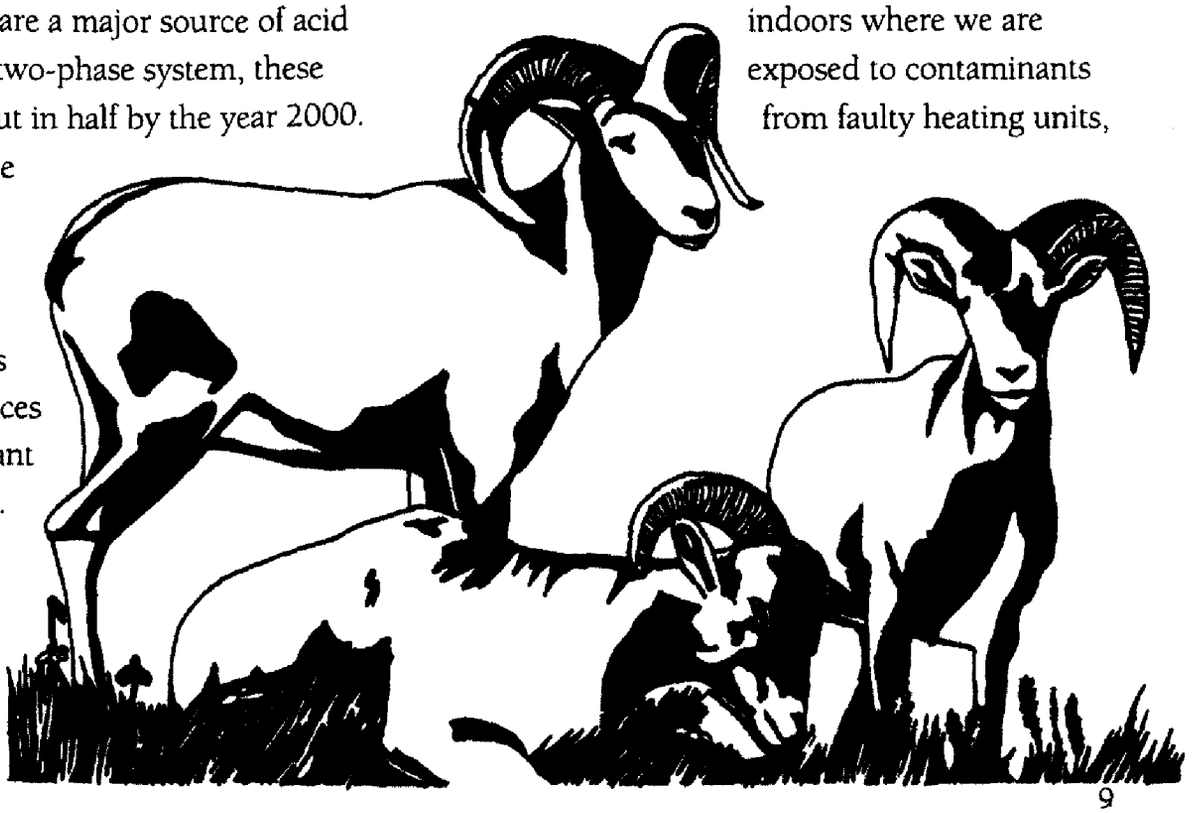
Other areas that fail to attain standards for **particulate** matter may be required to limit the use of wood stoves and fireplaces and to impose stiffer controls on industry.

In addition, emissions of 189 air toxics must be reduced by the turn of the century. EPA has published a list of source categories for which **Maximum Achievable Control Technology (MACT)** is being developed. Companies that achieve reductions of emissions before the regulations are proposed can receive six-year extensions to comply with the standard. EPA has estimated that overall health risks, including risk of cancer, respiratory disease, heart ailments, and reproductive disorders, will decline significantly once MACT controls are installed.

The CAA Amendments also look beyond the U.S. to reduce **acid rain** and address loss of stratospheric ozone. Sulfur dioxide emissions from power plants are a major source of acid rain. Under a new two-phase system, these emissions will be cut in half by the year 2000. Power plants will be issued emission allowances which can be banked or traded. If emissions exceed the allowances held, the power plant must pay a penalty. The CAA Amendments also restrict the use, emission, and disposal of ozone-depleting chemicals such as chlorofluorocarbons (**CFCs**, also known as Freons) and other chlorine- and bromine-containing compounds. CFCs are commonly used in refrigerators and air conditioners.

Working in consultation with state and local governments, EPA bears primary responsibility for this sweeping legislation. EPA's Office of Air and Radiation is the lead office for developing the scores of regulations required under the Act. States also share responsibility for issuing and enforcing air pollution **permits**. In some areas, local governments will test vehicle emissions and monitor other air quality issues.

Indoor air is often more polluted than the air outside our homes and workplaces. This has been shown to be true across the country, even in neighborhoods without heavy industrial **pollution**. More than 90% of our time is spent indoors where we are exposed to contaminants from faulty heating units,



gas stoves, fireplaces, cleaners, solvents, cosmetics, cigarette smoke, wall coverings, paints, and improperly stored chemical products.

Another significant indoor health hazard results from **radon** gas, which in many areas of the country seeps from the earth into homes. There are several ways to check and safeguard your home, with proper ventilation being one of the simplest. Radon test kits are available from a variety of sources including hardware stores, health departments, and environmental agencies.

In your home, make sure that gasoline cans for lawn mowers have securely fitted lids. These items as well as household hazardous chemicals should be stored outside the home when possible. Dispose of unwanted or unused solvents and **pesticides** properly. Some stores that sell these items will dispose of them for you. In many states, environmental agencies in cooperation with industries have sponsored "Household Hazardous Waste Days" during which citizens may take paint, solvents, and other wastes to local collection sites for proper disposal.

The quality of indoor air is largely up to individuals and businesses. Although safe working conditions are mandated by the **Occupational Safety and Health Administration (OSHA)**, no agency forces homeowners to provide clean indoor air. You must take steps on your own to improve the quality of indoor air in your home.

some questions & answers about air quality

Q. *Whom do I call to report visible* ***emissions*** *or noxious odors in the air?*

A. Generally, your state or local air quality office should be contacted. For emergencies, dial 911 or your local fire department or public health agency. Be aware that visible **emissions** are not necessarily the most harmful; most emissions are colorless or odorless.

Q. *Who monitors the required reports of toxic air emissions and safety measures used to control those emissions?*

A. EPA, your state air quality office, the **State Emergency Response Commission (SERC)**, and your **Local Emergency Planning Committee (LEPC)** monitor these reports.

Q. *Who sets the legal air exposure limits for toxic chemicals?*

A. EPA sets the standards for outside (**ambient**) air, OSHA for the workplace.

Q. *What is Best Available Control Technology? What is MACT?*

A. **Best Available Control Technology (BACT)** refers to the best equipment, techniques, or mechanisms that are currently available to achieve a level of pollution control. Through research, technology may be

available in the future to achieve even better controls. **MACT** is **Maximum Achievable Control Technology** and refers to the maximum degree of pollution reduction obtainable.

Q. *What happens to toxic airborne* ***emissions*** *when they are released from chemical plants, automobiles, or power plants? Do they change into other toxics when they mix? Where are they finally deposited?*

A. We are only beginning to find out what happens to emissions. Little is known about the interaction of chemicals in **ambient** air, but some effects such as **smog**, **ozone** depletion, **acid rain**, and **climate change** are a few of the known consequences when air emissions interact, are blown by the wind, and are deposited in cities, fields, and **wetlands**. These effects have generated new research to find answers.

Q. *Do weather conditions affect pollution and the dispersion of airborne chemicals?*

A. Yes. Weather conditions—including temperature, sunlight, precipitation, and wind—play a major role in how vapors and suspended particles behave. Sunlight can destroy or alter some airborne chemicals. Rain, snow, and wind affect where and when air pollutants are deposited on land or water.

Q. *Are incinerators a source of toxic emissions to the air?*

A. Well-designed, well-constructed, and well-operated **incinerators** can nearly eliminate toxic emissions to the air. To receive a **permit** to operate, a hazardous waste incinerator must demonstrate 99.99% efficiency in destroying most **hazardous wastes**. The standard is even stricter for dioxins and PCBs.

Q. *How does eliminating toxic wastes at the source of production differ from utilizing best available control technology (BACT)?*

A. Basically, at-source control is a **pollution prevention** approach that seeks to keep hazardous wastes from being produced. BACT, on the other hand, is the best technology for treating, containing, or reducing discharges and emissions.

surface water

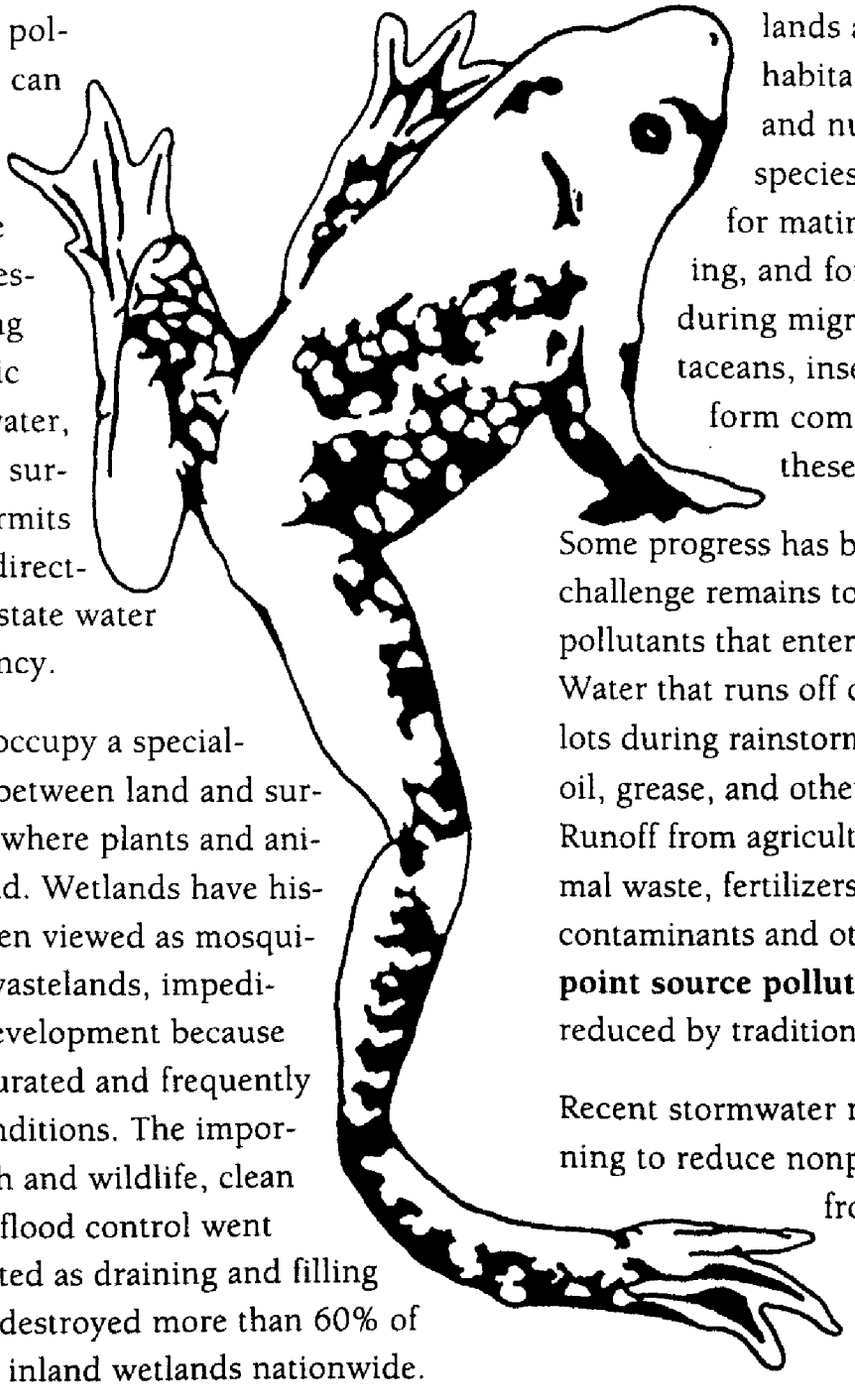
Although the vast majority of the earth's surface is covered with water, the oceans and seas are salty. Only 3% is fresh — and two-thirds of that is ice! This tiny fraction of fresh water sustains a multitude of very specific life forms, including our own. While many people get their drinking water from underground reserves, **surface waters** also are an important source. In addition, lakes, rivers, and streams provide boating, swimming, fishing, and other forms of recreation.

The economic support offered by plentiful and high quality surface waters includes agricultural irrigation, process and cooling waters for power plants, and chemical, steel, lumber, mining, and other industrial operations. The eastern U.S. has a bountiful supply of this natural resource, while in the western states, the relative scarcity of surface water serves to increase its value. In all parts of the country, however, we need to use our water efficiently. Using less water reduces the amount of wastes discharged into our lakes, streams, rivers, and oceans, as well as the energy needed to treat wastewater.

The cornerstone for protecting this valuable resource and controlling water pollution was the Federal Water Pollution Control Act of 1972. In 1977, the Act was reauthorized and renamed the **Clean Water Act (CWA)**. The goal of the CWA is the "restoration and maintenance of the chemical, physical and biological integrity of the Nation's waters." Under this Act, it is illegal to **discharge** pollutants from a **point source** into any surface water without a **National Pollution Discharge Elimination System (NPDES) permit. EPA** has the authority to set standards for the quality of wastewater discharges. Amendments to the CWA in 1987 increased the ability of EPA and states to improve water quality by addressing toxic discharges, allowing citizen lawsuits, and funding municipal sewage treatment facilities.

Most states have legal authority to implement and enforce the provisions of the Clean Water Act, while EPA retains oversight responsibilities for most state water programs. **Water quality standards**, criteria to assure that streams are "fishable and swimmable," are set by each state, with

EPA oversight and approval. State water pollution control agencies and EPA use these standards to set limits on the amounts of pollutants that can be discharged into surface waters. Questions dealing with specific bodies of water, monitoring surveys, or permits should be directed to your state water quality agency.



Wetlands occupy a specialized niche between land and surface water, where plants and animals abound. Wetlands have historically been viewed as mosquito-ridden wastelands, impediments to development because of their saturated and frequently flooded conditions. The importance to fish and wildlife, clean water, and flood control went unappreciated as draining and filling operations destroyed more than 60% of coastal and inland wetlands nationwide. Discharges from industries, midnight dumping of toxic wastes, urban runoff, **acid rain**, and agricultural chemicals have polluted and degraded wetlands as well.

Wet meadows, prairie potholes, wooded swamps, and coastal, saltwater marshes are distinctly different. But all wetlands are important wildlife habitats, breeding grounds, and nurseries. Hundreds of species of birds use wetlands for mating, nesting, brood-rearing, and for resting and feeding during migration. Fish, crustaceans, insects, and other animals form complex food chains in these valuable ecosystems.

Some progress has been made, but a major challenge remains to reduce and control pollutants that enter all surface waters. Water that runs off city streets and parking lots during rainstorms may contain metals, oil, grease, and other automotive fluids. Runoff from agricultural fields contains animal waste, fertilizers, and **pesticides**. These contaminants and others are called **nonpoint source pollution** and cannot be reduced by traditional end-of-pipe controls.

Recent stormwater regulations are beginning to reduce nonpoint source pollution from industries and cities. Farming practices that emphasize soil conservation and appropriate use of pesticides are effective in reducing pollutants in runoff. You can help prevent nonpoint source pollution by properly disposing of

used motor oil, using fewer pesticides, and carefully assessing lawn and garden practices. By reducing the potential contaminants we place on streets, driveways and lawns, we can make a substantial contribution to improving the quality of rivers, streams, lakes, and wetlands.

some questions & answers on surface water

Q. *Where can I get information about the water quality of streams, lakes, wetlands, and other bodies of water in my state?*

A. State water quality agencies, in general, maintain records of water quality for many state surface waters. General information about water quality is available through the state agency information offices, EPA, and many citizen groups. EPA maintains an Office of Water Resource Center to answer general questions about standards and water quality. The telephone number is 202/260-7786.

Q. *How are water quality standards developed for U.S. surface waters?*

A. EPA develops water quality **criteria** that indicate **concentrations** of contaminants that are not expected to harm human health and aquatic life. States may use these criteria to set water quality standards or they may develop their own standards that address state-specific needs, are scientifically defensible, and as stringent as the national criteria. States are required to review water quality standards every three years. New information from EPA, industry, or any other group concerning safe levels of materials in surface water may be considered, and existing standards may be revised to reflect current scientific developments. Notices of proposed revisions are published in newspapers to encourage the public to participate in the revision process. State standards must be approved by EPA.

Q. *How can I find out what materials are being discharged into local bodies of water?*

A. By submitting a request to the water pollution control agency in your state, you can review the National Pollutant Discharge Elimination System (NPDES) permits for specific dischargers into surface water. New permits and renewals of existing permits are published in local papers with information on how to review the permit application. State and federal agencies, including EPA's Office of Water and the **U.S. Geological Survey**, compile stream-specific water quality data in various reports available to the public.

Q. *What can I do if I think that an NPDES permit should not be issued or that the requirements of the permit are inadequate?*

A. Anyone may comment on the issuance or reissuance of an NPDES permit within the period listed in the public notice. The permit-issuing agency must respond to public comments before granting the permit. Most states have a process by which affected citizens and companies may appeal the terms and conditions of a NPDES permit or who receives one.

Q. *Whom do I contact if I see a spill or notice unusual conditions such as color, odor, or fish kills in a stream, lake, estuary, or coastal area?*

A. First contact your city or county public health department or check to see if your state has a toll-free **pollution** hotline. Any spill should be reported immediately to the **National Response Center** at **1-800-424-8802**. For other complaints and concerns about water quality, call your state agency representatives during normal business hours and ask for an investigation.

ground water

The nation's **ground water** resources are extremely valuable. Half of all Americans and more than 95% of our rural population get their household water supplies from underground sources. Ground water also is used for about half of all agricultural irrigation and a third of industrial water needs. In many places, this vital resource is already contaminated or threatened.

Even more than **surface waters**, ground water resources are often taken for granted because they are not visible. Rainfall and surface water which had seeped into the earth's crust over many years formed underground reservoirs. Where the **water table** is at or close to the surface, ground water enters **wetlands**, lakes, rivers, and streams and provides a base flow during dry periods. By comparison to rivers and streams, ground water moves very slowly and with little turbulence. Therefore, once contamination reaches ground water, little dilution or mixing occurs. While wells and springs in many parts of the country are abundant and supply good quality water, contamination in other areas may be severe but undetected until the ground water is used.

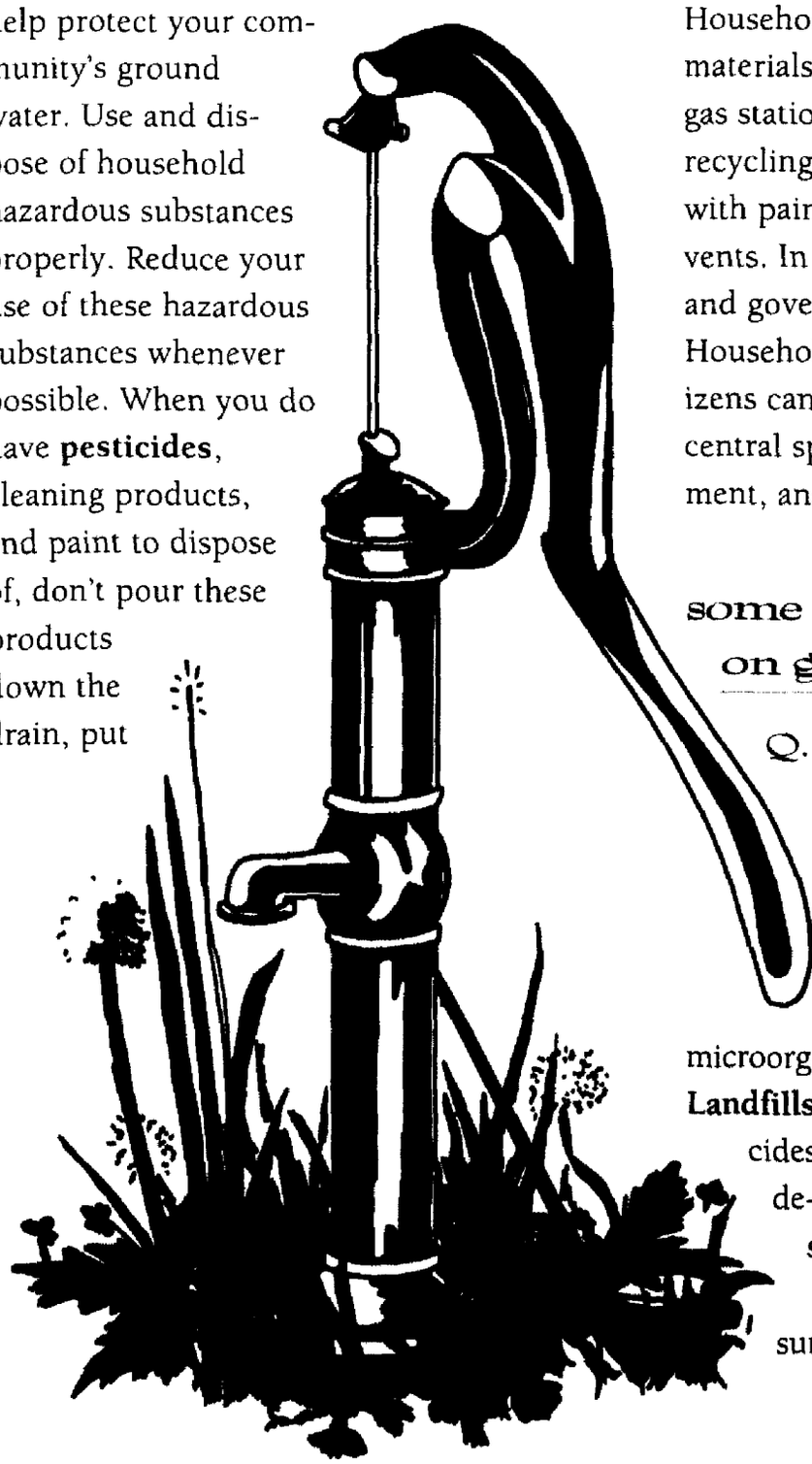
Activities to protect ground water are guided by several different federal and state laws and are conducted by a number of different agencies. Some states have comprehensive ground water protection statutes, but all states have some authority to protect ground water under solid and hazardous waste laws, public health laws, and energy extraction laws. Regulatory authority and information about ground water quantity and quality vary among state agencies, but usually reside in natural resources, environmental protection, or public health agencies.

Ground water issues in agricultural areas are the concern of a wide variety of organizations and institutions including soil and water conservation districts and commissions. In urban areas, local public works and planning departments can often respond to questions about the effects of land disturbance on ground water.

Federal statutes that authorize ground water protection include the **Safe Drinking Water Act (SDWA)**, the **Resource Conservation and Recovery Act (RCRA)**, and the

Comprehensive Environmental Response, Compensation, and Liability Act (**CERCLA**, or **Superfund** law). On the federal level, EPA has primary responsibility for ground water.

As an individual, you can help protect your community's ground water. Use and dispose of household hazardous substances properly. Reduce your use of these hazardous substances whenever possible. When you do have **pesticides**, cleaning products, and paint to dispose of, don't pour these products down the drain, put them in the trash, or dump them on the ground. Hazardous substances disposed of in these ways can find their way into both surface and ground water. Reducing home water use also will reduce ground water contamination.



Household products that are hazardous materials may be recycled. Check with local gas stations and automotive centers about recycling used motor oils and batteries and with paint stores for leftover paints and solvents. In many communities, businesses and government agencies sponsor annual Household Hazardous Waste Days when citizens can bring household chemicals to a central spot for collection, proper treatment, and/or disposal.

some questions & answers on ground water

Q. *How is ground water contaminated?*

A. Ground water may become contaminated when rainfall and surface runoff pass through contaminated soil. Water dissolves many substances and can carry particles and microorganisms with it into the ground water. **Landfills**, mining, improperly applied pesticides, improperly stored chemicals and de-icing salts, leaking **underground storage tanks**, improperly installed or failing **septic tanks**, and other surface activities can significantly alter

ground water quality. Contamination often goes undetected for many years.

Q. *If I notice a change in the taste, color, or odor of my well water, whom should I contact?*

A. You should contact your county health department, state agency with ground water responsibility, and state health department. These agencies can investigate the cause of the change in your well water. In addition, information on ground water may be obtained by calling EPA's Safe Drinking Water Hotline (**800/426-4791**) or the U.S. Geological Survey (USGS) (**703/648-4460**).

Q. *What should I do if I suspect that a nearby facility may be contaminating my well and the ground water?*

A. You should contact the agencies listed above. Depending on the circumstances, they may be able to help you. You might also contact the state agencies that issue environmental permits to the facility; permits can be reviewed by the public.

Q. *Can contaminated ground water be cleaned up?*

A. In some situations, yes. Contaminated reservoirs that are limited in size may be cleaned up by pumping water out of the **aquifer** for treatment by above-ground treatment systems. Also, methods are under development to treat ground water in the subsurface, such as **biodegradation**. However, ground water cleanup is very difficult, expensive, and less than completely effective. Preventing ground water contamination is more practical to ensure good water quality.

Q. *Are permits required for water supplies and sewage treatment systems?*

A. Yes. State health and environmental agencies are responsible for certifying the adequacy of municipal water supplies and sewage treatment systems.

Q. *What is the relationship between ground water and surface water?*

A. **Surface water** seeps into **ground water** during wet weather periods and the reverse occurs during drought conditions. When close to the surface, ground water often becomes surface water in the form of springs, wetlands, and streams. Contamination of ground water can pollute surface water and vice versa.

Q. *Are **underground storage tanks (USTs)** regulated?*

A. Yes. In 1988, EPA issued regulations setting minimum standards for new tanks and requiring owners of existing tanks to close, replace, or upgrade them. Tank owners and operators are required to meet leak detection requirements and to show they have financial resources to pay for cleanups should a leak or spill occur.

EPA estimates that there are from 5 to 7 million USTs nationwide. Most of the USTs hold petroleum and the rest hold hazardous materials, used motor oil, or other substances.

Q. *Who runs the UST program and who should be notified if a leak is suspected?*

A. State and local governments oversee the UST program. Report suspected leaks to the state implementing agency. Contact the RCRA/Superfund/UST Hotline at **800/424-9346** for the name, address, and telephone number of the agency in your state.

quency or location of application, or require the use of specially trained, certified applicators. EPA also can suspend or cancel the registration if later information shows that use of the pesticide poses unacceptable health effects.

pesticides

Few chemicals have had as much effect or been the subject of as much controversy in recent decades as pesticides. Broadly defined, a **pesticide** is any agent used to kill or control undesired insects, weeds, rodents, fungi, bacteria, or other **organisms**. Pesticides are used on food and feed crops, lawns and golf courses, in schools, in the home and other buildings, and to disinfect swimming pools and hospital equipment. Because of their wide application, EPA "registers" (licenses) thousands of pesticide products in the U.S. No pesticide may legally be sold or used unless the chemical's label bears an EPA registration number.

EPA must ensure that these pesticides will not present unreasonable risks to people, wildlife, fish, and plants, including **endangered species**. Under the **Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA)** and its 1988 Amendments, the chemical's benefits must outweigh the risks. FIFRA gives EPA the authority to limit the amount of pesticide applied, restrict the frequency or location of application, or require the use of specially trained, certified applicators. EPA also can suspend or cancel the registration if later information shows that use of the pesticide poses unacceptable health effects.

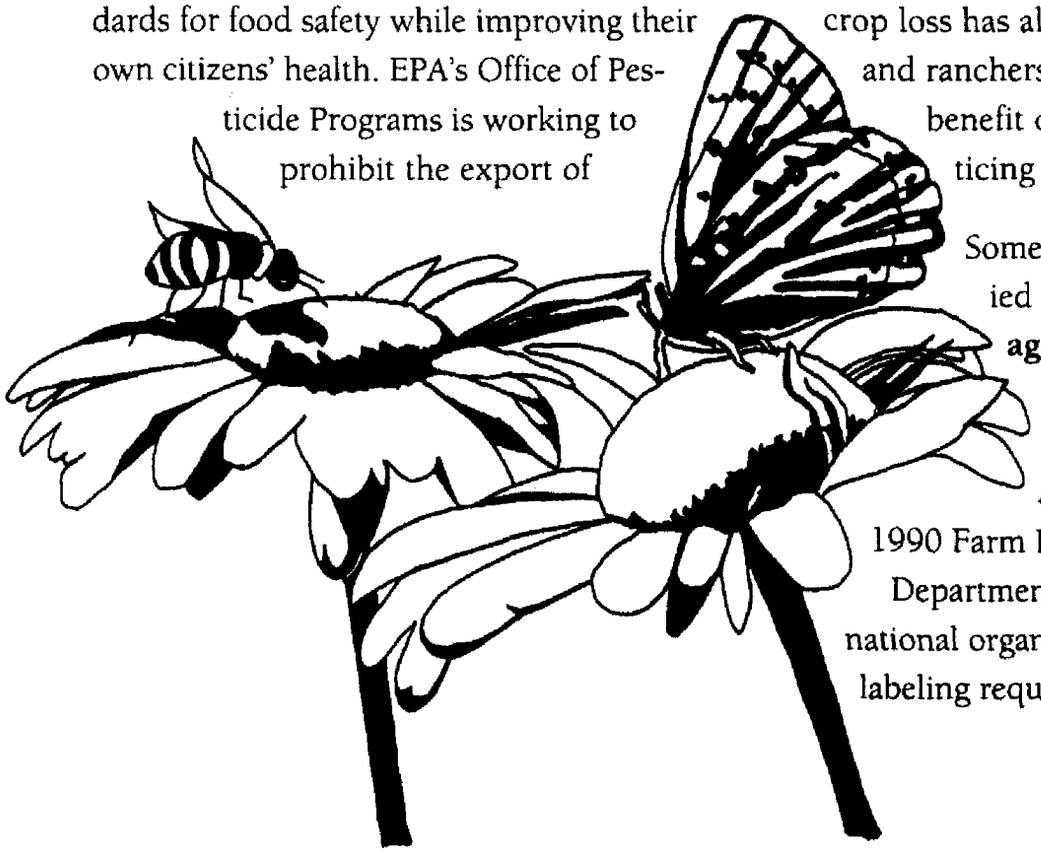
Pesticide registration decisions are based primarily on EPA's evaluation of test data provided by applicants. Testing is needed to determine whether a pesticide can cause adverse effects, including acute toxic reactions, skin and eye irritations, cancers, birth defects, and reproductive system disorders. Data on how a pesticide behaves in the environment also is required. This information lets EPA determine whether a chemical poses a threat to ground water or to "non-target" species (other than those the pesticide is meant to control).

Many of us are concerned about food safety but don't understand how crops are raised or how our fruits and vegetables arrive at grocery stores. We seem to have an abundance of fresh produce every day, regardless of what is "in season." Advances in technology over the years have ensured bumper crops of many fruits and vegetables, and what we don't grow in this country we import from abroad.

Pesticides can be registered or re-registered under FIFRA for use on our food or feed crops only if "tolerances," or maximum legal limits, for residues are established under the Federal Food, Drug, and Cosmetic Act (FFDCA). These tolerances help ensure that consumers (especially infants and children) are not exposed to unsafe levels of pesticides remaining in or on their food. EPA sets a tolerance only if chemical and toxicological data, as well as residue and food consumption data, show no unreasonable risk to consumers from eating foods containing low-level residues of the pesticide—even over an entire lifetime.

EPA also is working to develop and maintain programs that will protect world health and the global environment from adverse effects of pesticide use. A major objective is to improve foreign countries' abilities to meet our standards for food safety while improving their own citizens' health. EPA's Office of Pesticide Programs is working to prohibit the export of pesticides that are banned from use in the U.S. because we may be importing fruits and vegetables grown and harvested with these same chemicals. Likewise, use of banned pesticides or improper application may lead to contaminated topsoil and ground water, and may have lasting adverse effects on wildlife in these other countries.

In addition, EPA is making a concerted effort to safeguard farmworkers in the U.S. through a combination of educational, regulatory, and research programs. Many farmworkers are non-English-speaking immigrants who are unable to read instructions or warnings on product labels. These applicators must contend with many insect and weed species that have become resistant to insecticides and herbicides, necessitating higher doses and increased applications. In the last 40 years, pesticide use has increased 10-fold, yet crop loss has almost doubled. Many farmers and ranchers have come to question the benefit of pesticides and started practicing alternative farming methods.



Some of these methods are embodied in the concept of **sustainable agriculture**, which was officially recognized by Congress when the Organic Foods Production Act was passed as part of the 1990 Farm Bill. This law required the U.S. Department of Agriculture to develop national organic certification standards and labeling requirements for crops that are

organically grown. USDA is being advised by a National Organic Standards Board composed of farmers, processors, scientists, and environmentalists. USDA will be publishing regulations that list synthetic and natural substances and **biochemicals** that will be permitted or prohibited in organic production. Any formulated products must be registered with EPA.

As a consumer, you can remove pesticide residues by thoroughly washing your fruits and vegetables with soap and water. If you feel you need to use a pesticide in your home, first seek advice from local professionals. Many nurseries, hardware stores, and garden centers have staff who are knowledgeable about the best product to use and how to apply the chemical. You may not need a pesticide at all—sometimes cleaning or removal of objects attracting a "pest" are all that is necessary. Take special precautions to apply the chemical exactly according to the label instructions. Wear protective clothing indicated on the label over hands and face and keep all containers isolated from children or pets. Close off rooms to children and pets when a pesticide has been applied, and never use a pesticide close to your face.

Outdoors, be aware that pesticides also can kill many beneficial insects as well as birds and squirrels. Some chemicals are unusually persistent, meaning residues are left in the environment for long periods of time, even years. Watch for "Household Hazardous Waste Disposal Days" in your community to bring any unused amounts or empty containers for proper disposal. Because of their inherent nature, all pesticides, including home, lawn, and garden pesticides, are potentially toxic and should be used with the utmost care.

some questions & answers on pesticides

Q. *Are there any alternatives to using pesticides?*

A. Yes. Scientists have begun to manage, rather than try to eradicate, certain species using **Integrated Pest Management** (IPM). IPM uses a combination of biological, cultural, and genetic control methods, with use of pesticides as the last resort. Understanding a species' life cycle is essential to reduce the use of pesticides. Population explosions can be prevented and reptiles, birds, bats, and predator insects used as natural pest controls. A sustainable farm **ecosystem** provides habitat for a multitude of beneficial organisms which maintain the pest-predator balance.

Q. *What natural controls can I use in my garden?*

A. Many garden shops and nurseries have resident experts on this topic, as do county extension services. Some common methods include planting marigolds to repel asparagus beetles. Beer or vinegar in a shallow pan readily attracts and traps slugs and snails. Gypsy moths on oak and ornamental trees can be

controlled by a common bacterial spray applied at the hatching and early larval stages (a form of IPM). In addition, several soaps are on the market that are pest-specific and biodegradable.

Q. *How can I get rid of cockroaches in my kitchen?*

A. Mix equal parts of powdered sugar and powdered boric acid, obtainable from any hardware store. Sprinkle in corners and along baseboards. Find points of entry and seal them off. Store food in sealed containers and keep the kitchen clean. At night, drain your sink and wipe dry. Cockroaches are dependent on water, so check for small leaks under the sink and seal.

Q. *What does **organically grown** mean?*

A. Growing organically is an alternative approach that views the farm as an agroecosystem. The key principle is **biodiversity**, first accomplished by building a balanced, fertile soil rich in microorganisms. This concept of "feeding the soil, not the plant" imparts resistance and vigor to the crops grown. A diversity of crops are grown in a long period of rotation, particularly grasses and legumes for animal forage and green manures. Such rotations break pest life cycles, improve soil fertility, and reduce soil erosion. In addition, the natural resources on the farm such as forests, **wetlands**, and meadows are viewed as critical resources for climate and water management and provide habitat for indigenous species.

Certified organic crops can be harvested after three continuous years since the last application of a prohibited pesticide or fertilizer. But organically grown does not mean "no spray." Farmers can use naturally derived pesticides that break down quickly in the environment; some wash off with rain. Other synthetically derived materials that can be used include toxins from bacteria, soaps, fish emulsions, vitamins, minerals, and certain medicines for livestock. In practice, livestock must be fed organically grown grains and forages, and can receive no hormones, antibiotics, or medications that increase growth or production.

Q. *What pesticides are banned in the U.S.?*

A. Over the years, EPA has banned 42 different pesticides, including aldrin, DDT, dinoseb, and vinyl chloride. Others are called restricted-use, meaning they must be applied by or under the direct supervision of a certified applicator. Banned or restricted chemicals are acutely toxic to farmworkers and applicators, as well as various mammals, birds, and aquatic animals, and have environmental effects long after suspended use.

hazardous waste

Today's world is complex — sophisticated technologies produce consumer goods ranging from cars to cleaning fluids. Many of these processes generate **hazardous wastes** of one sort or another. Hazardous wastes are specifically identified by EPA because they have characteristics that make them potentially dangerous. Hazardous wastes include chemicals that are **corrosive, flammable, reactive**, or toxic. Hazardous wastes may be **by-products** of manufacturing processes or discarded consumer products, such as household cleaning fluids, paints, and batteries.

Once generated, hazardous wastes require proper storage, treatment, and **disposal**. While major industries must follow specific regulatory requirements for handling hazardous wastes, many companies are instituting **pollution prevention** techniques that reduce the amounts of wastes that are generated. Individual citizens also should try to reduce the amounts of chemicals used. When we must discard hazardous materials such as **pesticides** and old paint, we should follow proper disposal practices to protect our environment.

Currently operating industries that produce hazardous wastes are regulated by the provisions of the **Resource Conservation and Recovery Act (RCRA)**. One of the RCRA requirements is the **cradle-to-grave** reporting system that tracks hazardous wastes from the factory through transportation, treatment, and **disposal**. Most states have received authority from EPA to regulate and enforce RCRA; EPA controls hazardous waste storage, treatment, and disposal in those states that do not have this authority.

In addition to active facilities regulated under RCRA, some sites have abandoned hazardous wastes for which ownership is unclear or unknown. In these situations, control and cleanup is possible through the **Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)**, commonly known as **Superfund**. Under the Superfund program, EPA has the authority to clean up the nation's worst hazardous waste sites using money from a trust fund supported primarily from a tax on chemical **feedstocks** used by manufacturers. Those sites have been placed on EPA's **National Priorities List (NPL)**. Companies or individuals responsible for the wastes are identified by

EPA, if possible, and made to pay for the cleanups.

Your participation as a concerned community member is an integral part of the Superfund cleanup process. The **Superfund Amendments and Reauthorization Act (SARA)** of 1986 specifically provided for public participation in selecting the appropriate remedies for site contamination problems. EPA assigns staff to each Superfund site to work with the local community to reach decisions related to site cleanup activities. EPA is required to make site-related information accessible to the public. In most cases, this information and records of EPA decisions about the site are placed in the public library or town hall.

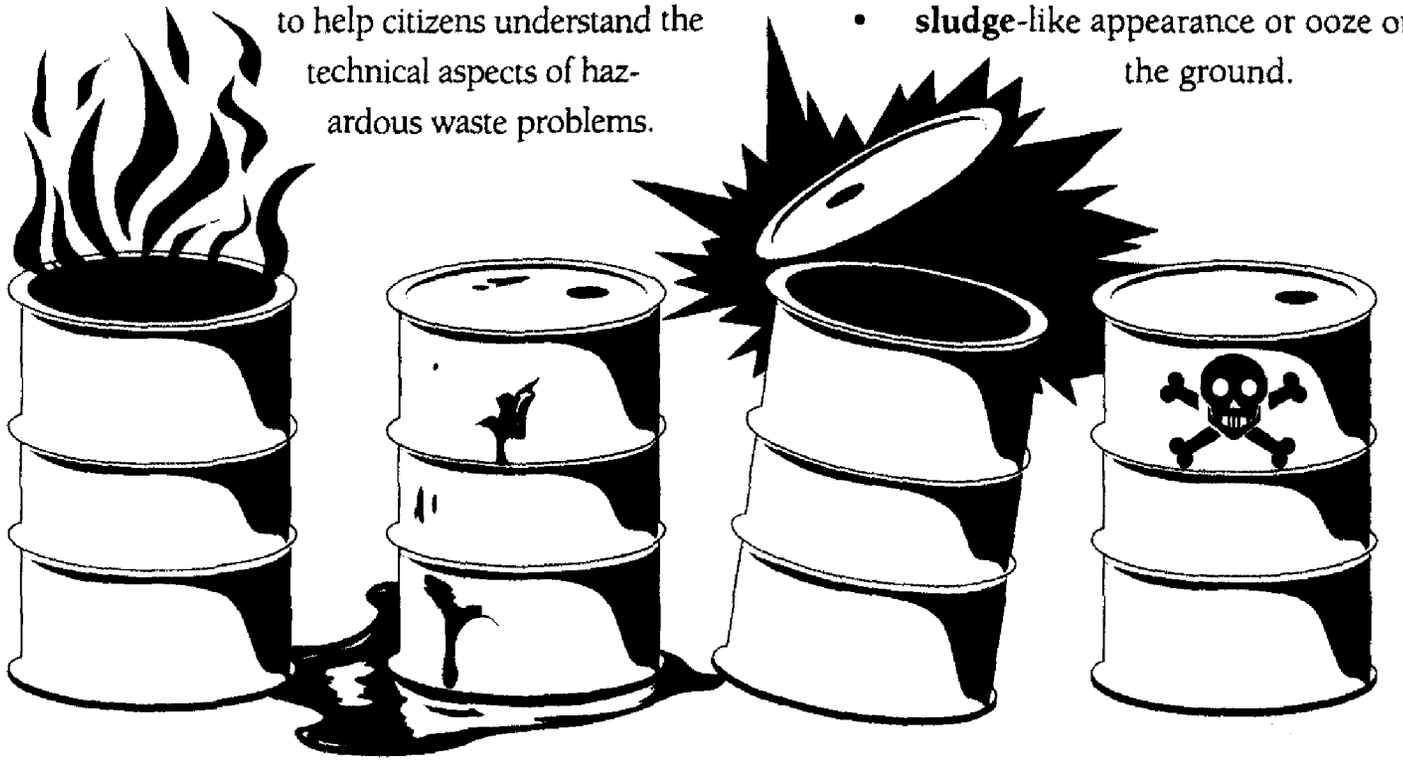
Communities near Superfund sites have numerous resources available to them for meaningful participation in the management and cleanup of the site. For example, technical assistance grants (TAGs) from EPA are authorized under SARA. These grants allow communities to hire experts to help citizens understand the technical aspects of hazardous waste problems.

some questions & answers on hazardous waste

Q. *What should I do if I suspect hazardous waste dumping?*

A. Contact the **National Response Center** at **1-800-424-8802** if you detect signs of illegal dumping such as:

- drums in the woods, on roadsides or abandoned property, in empty buildings or city or county **landfills**;
- odors that smell like turpentine, paint, fingernail polish, glue, rotten eggs, or any unfamiliar chemical odor;
- discolored soil with dead vegetation along roadsides, in abandoned lots or fields, around vacant buildings, or beside streams and rivers;
- abandoned warehouses or factories with leaking drums or waste-like material;
- **sludge**-like appearance or ooze on the ground.



Q. *Are hazardous substances regulated under RCRA?*

A. No. RCRA only regulates hazardous substances once they become wastes, but some hazardous substances are regulated under the **Toxic Substances Control Act (TSCA)** or by the **Occupational Safety and Health Administration (OSHA)**. Many hazardous chemicals must be reported to federal, state, and local officials under the **Emergency Planning and Community Right-to-Know Act (EPCRA)**.

Q. *Can hazardous wastes be incinerated safely? Does incineration make hazardous wastes non-hazardous?*

A. A hazardous waste **incinerator** that is properly designed and operated to meet performance standards set by EPA can safely and effectively reduce or destroy a wide variety of hazardous wastes. Depending on the composition of the hazardous wastes, some wastes can be rendered non-hazardous. The residues left after incineration, such as ash and materials from air pollution control equipment, must be properly managed and disposed of in accordance with EPA requirements.

Q. *Why are new commercial incinerators being built?*

A. Federal legislation mandated each state to provide, by October 17, 1989 a 20-year plan to assure that the state had the capacity to dispose of hazardous and solid wastes generated within its borders. Most hazardous wastes cannot be landfilled and some must be incinerated because they have no other disposal method. In addition, many states simply have no available landfill space, and so municipal solid waste, including household garbage, must be incinerated. But many new facilities are waste-to-energy plants which convert the heat from combustion into electricity for the community, an added bonus to eliminating tons of trash.

Q. *How are citizens assured that permitted hazardous waste facilities are complying with the law?*

A. Hazardous waste inspectors have the right to enter a facility at any reasonable time for an inspection, which may be unannounced. Facilities are inspected for compliance with laws and regulations, as well as with the specific conditions of their individual permits. When violations are found, they are followed by appropriate actions, ranging from issuance of a non-compliance notice to initiation of a criminal investigation. If you have reason to believe that a hazardous waste facility is not complying with the law, call your state environmental office with responsibility for hazardous waste. A complaint filed with the agency may result in an unannounced inspection of the facility.

Q. *What is the difference between hazardous waste management and treatment?*

A. Hazardous waste management refers to the precautions taken to reduce the dangers of handling or disposing of hazardous wastes.

Hazardous waste treatment refers to practices which render the wastes non-hazardous or less harmful. Treatment methods include **neutralization**, such as mixing **acids** with bases to make their **pH** more like that of water, biological treatment to break the waste down into simpler compounds, and incineration.

Q. *What is being done to reduce hazardous wastes?*

A. Better manufacturing processes and worker training are reducing quantities used and non-hazardous or less hazardous ingredients are being substituted in processes. Some wastes are refined and recycled; others are immobilized so they cannot be released into the environment. Another important way is to design well-managed, well-regulated hazardous waste management facilities with proper state permits.

Q. *Officials in my area have just declared an old abandoned property in my community a Superfund site. What does that mean?*

A. Under CERCLA, abandoned hazardous waste sites that pose an immediate threat can be cleaned up under emergency response and removal programs. Sites that do not pose an immediate danger but have significant contamination may be cleaned up by responsible parties or under federal or state investigation and cleanup programs.

Q. *Shouldn't the folks who put the chemicals in the dump pay for the cleanup?*

A. Yes. Using Superfund enforcement authority, EPA locates the owners, operators, generators, and transporters and negotiates for the cleanup. Those who contributed only minimal amounts or low-toxicity wastes (de minimis parties) can "cash out", putting their proportional share of costs into a trust fund for the cleanup. Or EPA can order non-cooperative parties to conduct the work. Cleanup doesn't have to wait until legal and financial issues are resolved. EPA can stabilize the site and then pursue responsible parties to recover costs and commit to long-term remedial actions.

Q. *How do I dispose of household hazardous wastes, such as old pesticides, paints, acids, cleaners, and used oils?*

A. Watch your newspaper for local "Household Hazardous Waste Disposal Days." Often local organizations or businesses, in cooperation with state environmental agencies, will sponsor free disposal if you bring your materials to a specified collection site. Public service announcements on television and radio also help to promote such events. In addition, some local gas stations recycle used motor oils and old automobile batteries.

The best way to deal with household hazardous wastes is to purchase products wisely. Estimate your needs accurately and buy the smallest quantity possible.

solid waste

Solid waste continues to receive a great deal of media attention across the country as cities and counties deal with the lack of available space to dispose of household garbage and municipal solid waste. How to manage our wastes has been a problem for decades. In the early 1960s, cities and towns across the country practiced open air burning of trash. In response, Congress passed the Solid Waste Disposal Act in 1965 as part of the amendments to the **Clean Air Act**. This was the first federal law that required environmentally sound methods for **disposal** of household, municipal, commercial, and industrial waste.

In 1970, Congress amended this law and passed the Resource Recovery Act, the first nationwide recycling initiative. Federal agencies were recycling high-grade white paper and newsprint with the slogan, "Use it Again Sam." The beverage industry at this time switched from tri-metal to the lighter but more expensive aluminum, primarily to save transportation and equipment costs. That switch paved the way for other major recycling efforts and created a demand for "post-consumer" materials.

But the early days of the "sanitary" **landfill** fouled **ground water**, soil, **surface water**, and air because of improper disposal methods. Engineers have since designed new liners and **leachate** treatment systems to prevent environmental degradation. Today, landfill space is at a premium. Other options include **incineration, recycling, source reduction**, and **biodegradation** as viable alternatives to solid waste disposal.

Each of us is part of the problem as well as the solution. From gum wrappers to used cars, we exert our personal choices in what we purchase, how we use the product, and how we dispose of the waste.

Simple solutions include purchasing goods with less packaging, maintaining and repairing household appliances, and carrying reusable shopping bags. **Recycling** newspapers, aluminum cans, glass, and some plastics is becoming more common at schools and the workplace. Even if your town does not have a recycling program, you can effectively reduce waste while conserving raw materials and energy. Yard and food wastes make up at least 25% of materials heading for landfills. But making **compost** of these wastes replaces

soil nutrients and commercial fertilizers when placed in the garden. Removal of these materials from household garbage also extends the useful life of existing landfills.

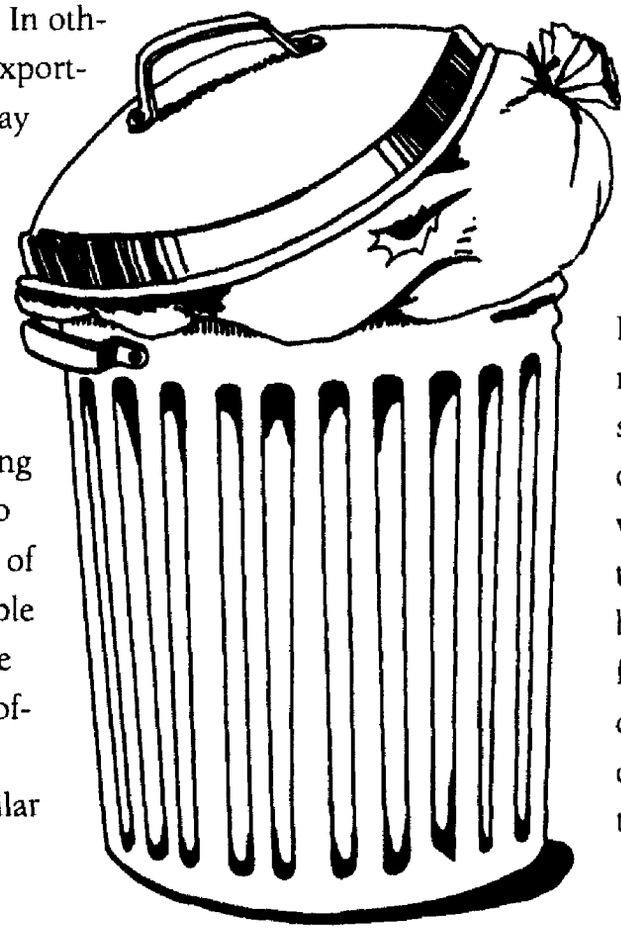
some questions & answers about solid waste & waste disposal

Q. *How do we dispose of solid wastes?*

A. In 1990, more than 67% of our wastes were landfilled. We recycled about 17% and the balance (16%) was incinerated.

Q. *How is out-of-state garbage regulated?*

A. Current legal readings of **interstate commerce** laws suggest that a state, in general, cannot flatly refuse to accept out-of-state waste. In other words, wastes exported to your state may be restricted only to the degree in-state wastes are restricted. For example, if in-state or county mandatory recycling laws are enacted to require separation of waste into recyclable and non-recyclable components, out-of-state waste can be restricted in a similar manner.



Q. *What goes into a solid waste landfill? What happens to it over time?*

A. In 1990, on average, the solid waste that went into a typical municipal landfill was estimated to contain 38% paper; 18% yard waste (trimmings, leaves, etc.); 8% metals; 7% food; 7% glass; 6% wood; 8% plastics; and 8% miscellaneous. Biodegradable materials may decompose over many years, while non-degradable materials, such as glass and most plastics, remain at the site.

Q. *When rainfall leaches through an unlined landfill, how is ground water affected?*

A. Leachate can contain a variety of substances depending upon the contents of the waste, including metals, organic compounds, suspended particles, and bacteria. If toxic wastes are deposited in the landfill, the leachate can contain toxic chemicals that are hazardous even at low levels. Many of these substances pollute the ground water.

Most leachates are collected at permitted landfills and treated at local sewage treatment plants. Treatment can include aeration to eliminate **volatile** compounds and gases and to enhance oxygen-dependent breakdown of organics, settling or filtering to remove sediment, and other treatment to stimulate chemical or microbial breakdown of contaminants.

Q. *Are hazardous wastes disposed of in landfills?*

A. Both hazardous and solid waste regulations prohibit disposal of hazardous waste in a landfill that is not specifically designed and permitted. Nevertheless, we generate a great deal of hazardous wastes in our homes that we unwittingly dispose of daily. For example, pesticides and paint thinners may be tossed in trash taken to the landfill. Most businesses are regulated and monitored for their hazardous waste disposal practices. Although some people and companies illegally put hazardous wastes in landfills, heavy penalties including fines and jail sentences make illegal disposal very unattractive.

Q. *How do we know that infectious hospital wastes are not going into landfills?*

A. Only non-infectious hospital waste can be legally dumped in a non-hazardous waste landfill. Hospitals operate under regulations that specify disposal requirements for **medical wastes**. Violations of these rules can subject hospitals to substantial penalties.

Q. *How is the volume of waste entering a landfill regulated?*

A. Generally, the volume of waste accepted is set in the terms of the landfill permit, usually as tons per month. The landfill operator weighs the waste upon arrival, and tonnage reports must be submitted on a periodic basis to state environmental agencies.

Q. *How close can a landfill be to my house?*

A. State and local regulations may require that a landfill be a minimum distance from an occupied dwelling unless written permission to be closer is given by the occupant. A common distance is 500 feet.

Q. *Won't a landfill attract pests such as rats, flies, and cockroaches?*

A. At the end of each day, a landfill is required to be covered with a layer of soil to deter scavenging animals. If the cover is properly applied, these pests should be less of a problem.

Q. *How will a landfill affect my well water? Who can check my water to be sure it remains unpolluted?*

A. Some state and local regulations require a landfill to be located a minimum distance (in some states, at least 1,200 feet) from a well water supply. **Monitoring wells** required around the landfill aid in the detection of ground water contamination before it reaches the drinking water well. Monitoring reports are usually available upon request from the county government, state environmental agency, or your local health department, or county extension service.

If a well owner desires testing of a well, a certified laboratory should be hired to run the tests. Names of such laboratories can be obtained from your local health department.

Q. *How is a landfill closed? Are there any possible uses or restrictions for a closed landfill?*

A. A landfill that reaches capacity is covered with a multi-layer, protective **cap** and planted with grasses and other ground covers. The owner must then conduct post-closure care, which includes monitoring of ground water, landfill gases, and leachate collection systems. Monitoring may be required for 30 years following closure.

Few restrictions exist on how the property over a closed landfill can be used. Parks and golf courses are examples of possible uses. Construction of large buildings is usually avoided because of settling that occurs during biodegradation and compaction of the waste.

bringing people of all races, cultures, incomes, and educational levels into the mainstream of environmental laws, regulations, and policies.

A major public health issue today is exposure to lead. Elimination of leaded gasoline has reduced air-borne exposure for the general population.

public health

Society's earliest historical records reveal that public health problems have been associated with life in large communal groups. Early writers documented such epidemic diseases as cholera, plague, and polio, and attributed them to crowded living conditions in cities and villages. Epidemics were later traced by scientists and physicians to lack of sanitation and disease-carrying **organisms**. With these discoveries, public health agencies emerged to prevent such occurrences by building sewers and water purification plants. Innoculation campaigns continue through modern times.

Public health research today addresses the more difficult cause and effect relationships behind cancer, leukemia, and birth defects. Citizen participation in these investigative activities through questionnaires and providing illness and lifestyle information greatly assists in the effort. But minority and low-income communities are often characterized by poor health and lack of education, two factors that exacerbate exposure to **toxic substances**. EPA has committed to address **environmental justice** concerns by

But threats remain for children, who are most susceptible to the adverse effects of lead. In many homes, lead from old pipes and solder may dissolve into the water. If you have plumbing that was installed before the early 1950s, you can reduce your exposure to lead by letting the tap run for a few minutes. Use only cold water for cooking or drinking.

Another avenue of exposure to small children, and perhaps the greatest, is through lead paint in older housing. Small children tend to stick almost anything in their mouths. If a child swallows chips of lead-based paint, exposure to lead is increased. To help protect small children, the Consumer Product Safety Commission no longer allows the sale of paints with high levels of lead. The Centers for Disease Control and Prevention suggests that paint already existing inside and outside of buildings be tested for lead. If the lead content is high, the paint should be removed in a safe manner and replaced with a lead-free paint.

State health departments often oversee public water supplies and private **septic tanks** in addition to duties associated with food safety. Many states maintain registries of diseases such as cancer and birth defects. Studying patterns of incidence may help identify causes and allow public health agencies to target resources on high risk diseases, behaviors, or locations. The **Centers for Disease Control and Prevention (CDC)**, an arm of the U.S. Department of Health and Human Services (HHS), conducts research on the causes of disease and tracks the progression of infectious and other diseases. **The Agency for Toxic Substances and Disease Registry (ATSDR)** is a part of the Public Health Service in HHS. The mission of ATSDR is to protect the public from exposure to hazardous substances in the environment. See Government Agencies section.

some questions & answers on public health

Q. *Where can I find information about disease rates in my community?*

A. In many states, the state health department may have a registry of diseases such as cancer. A call to your state health department should let you know if the registry can give you information specific to your community. Your local health agency may also be aware of research that may have been performed in your community by universities or other researchers.

Q. *Do chemical companies and other industries keep track of employees' cancer and respiratory illnesses and deaths?*

A. Many large companies do. Some companies keep extremely detailed medical records on employees. Larger companies may have an **epidemiologist** who studies the incidence of disease in workers. Smaller companies may not have as detailed medical records on employees and may not keep them for long.

Q. *Whom do I call about suspected contamination of my public water supply?*

A. The water pollution control agency or public works department in your county or state has an office dealing with the safety of public water supplies. Ask them for the office to contact with questions and concerns.

The NRC is the primary communications center for reporting major chemical and oil spills and other hazardous substances into the environment. Operated by the U.S. Coast Guard since 1972, the NRC receives reports of transportation emergencies, oil and hazardous substance spills, and other chemical accidents.

community safety

Every day, oil and hazardous substances are spilled or released into our harbors and waterways, onto the ground, and into the air. Some of these incidents are relatively minor, some cause disruptions in the community, and others cause serious damage and take lives. Most such incidents are handled at the local level, by fire fighters, police, and emergency medical teams. In many cases, the owner or operator of a facility will handle the cleanup or provide help to local responders, sometimes in the form of technical advice or a trained hazardous materials team.

Some serious incidents, however, warrant activation of the National Response System. When the person in charge of a facility or vessel containing a hazardous substance becomes aware of a release in a reportable quantity, that person must notify the **National Response Center (NRC)** at **1-800-424-8802**. Reportable quantities have been established for 779 hazardous substances. Similarly, a discharge or spill of oil that causes a discoloration or "sheen" on the surface of the water must be reported.

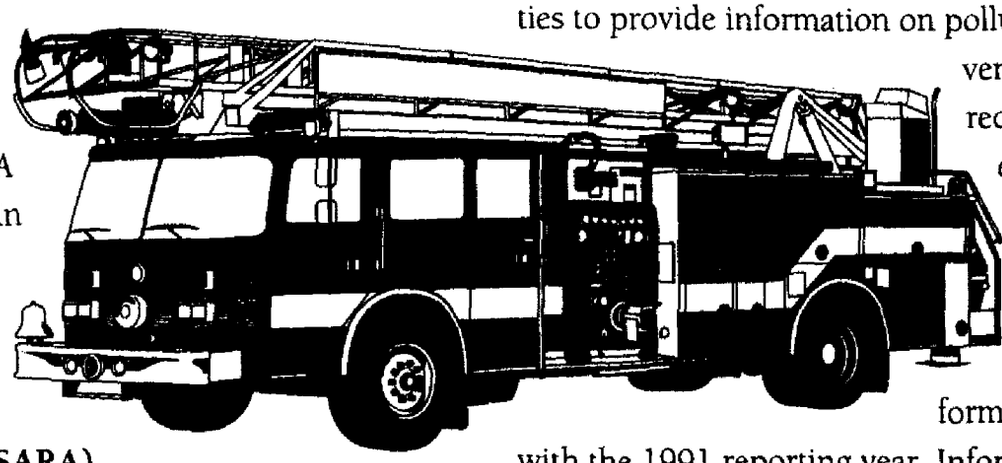
The NRC relays information to a predesignated federal **On-Scene Coordinator (OSC)**, based on the incident's geographical location. Coastal and tidal waters fall under Coast Guard jurisdiction; EPA manages inland waterways and spills on land; the Departments of Defense and Energy manage incidents on their respective properties.

When the federal OSC receives a call, he is backed up by Special Forces: the U.S. Coast Guard's **National Strike Force (NSF)** composed of three teams: Atlantic, Pacific, and Gulf coasts; EPA's **Environmental Response Team**; and the **NOAA Scientfic Support Coordinators**. EPA's 10 regional offices each have a team of OSCs and direct responders who can access any of the Special Forces for assistance. The OSC in turn contacts state and local agencies to coordinate their role.

State Emergency Response Commissions (SERCs) administer community safety programs and appoint **Local Emergency Planning Committees (LEPCs)** in all major cities

and every county. LEPC members include state or local officials, police, fire, public health, environmental, hospital, and transportation officials, as well as community groups and the media. The **Emergency Preparedness Coordinator** at the county level is usually the chairperson of the LEPC and has a listed telephone number, although large cities frequently have a separate LEPC.

The key statute directing all of these federal and state activities is the **Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA)**. When CERCLA was amended in 1986 by the **Superfund Amendments and Reauthorization Act (SARA)**, Title III of SARA authorized the **Emergency Planning and Community Right-to-Know Act (EPCRA)**. This law is based on the premise that citizens have a right to know about chemicals in their communities. EPCRA has two main purposes: to encourage planning for responses to accidents, and to provide the public and the government with information about possible chemical hazards in communities.



Section 313 of EPCRA requires certain manufacturers (those in **Standard Industrial Classification (SIC) Codes** 20-39) to report to EPA and the states the amounts of over 300 **toxic chemicals** and 20 chemical categories that they release directly to air, water, or land, inject underground, or transfer to off-site facilities. In addition, EPCRA specifies that EPA must compile these reports into an annual inventory of releases and transfers — the **Toxic Release Inventory (TRI)** — and make that inventory available to the public.

In October of 1990, Congress passed the **Pollution Prevention Act**, requiring all TRI facilities to provide information on pollution prevention and recycling efforts for each chemical on their reporting forms beginning with the 1991 reporting year. Information includes quantities recycled, source reduction practices, and changes in production. EPA recently added two chemical categories and 32 additional chemicals that require reporting.

By the end of 1994, EPA will add 313 priority pollutants to the list, including acutely toxic chemicals, flammable gases and liquids, explosives, and **pesticides**. Small-source exemptions will be proposed at that time. In early 1995, TRI reporting will be extended to treatment plants for drinking water, utilities, mining companies, propane retailers, and oth-

er nonmanufacturing industries associated with significant chemical releases.

These right-to-know efforts have been enhanced by a 1994 Executive Order committing EPA and other federal agencies to **environmental justice** for minority and low-income populations. Efforts to educate and empower citizen groups, native Americans, and new immigrants to our shores will ensure early participation in environmental decision making, form partnerships, and promote sustainable communities.

Another law intended to improve public safety is the **Hazardous Materials Transportation Uniform Safety Act (HMTUSA)**. Under this law, local emergency planners and responders can receive grants and technical assistance from the federal government to help communities deal with the risks from transporting hazardous materials. HMTUSA is aimed at improving transportation safety by ensuring that hazardous material manufacturers, transportation companies, and community safety officials reduce the threat of chemical accidents on our nation's highways, railroads, and waterways.

some questions & answers on community safety

Q. *How do I know what chemicals are used or made in an industrial plant near my home and what amounts are being stored there?*

A. Ask the plant for a copy of EPCRA Section 311 and 312 data submitted to the LEPC and an explanation of the codes used. Or, ask the LEPC for this information.

Q. *In case of an accident at a chemical plant, who will warn me and my family about toxic emissions and provide for appropriate protection?*

A. Your LEPC has developed warning systems, evacuation plans, and shelter-in-place instructions. You can also ask the local plant to explain how their emergency response plans mesh with the LEPC. The plant must report immediately all incidents of chemical releases to the NRC, the SERC, and the LEPC.

Q. *Are visible, continuous **emissions** or odors from an industrial plant harmful?*

A. To identify whether specific emissions are harmful, you should ask the plant manager about emissions and request a copy of the plant's SARA Section 313 data. Or, ask your SERC for the data. EPA's Chemical Emergency Preparedness and Prevention Office also may be able to help. After identifying the chemicals and volumes being emitted, **Material Safety Data Sheets (MSDS)** may help you to determine **risk**. Remember that risk depends on the dose received; Section 313 data are reported annually and can not be used alone to accurately determine exposure or dose, or their consequences.

Q. *Where do I get the MSDS for the emissions in question? Can I understand an MSDS? Isn't it too technical?*

A. An MSDS is a fact sheet that describes how to use, handle, and dispose of a specific chemical (see the Glossary). The plant that manufactures, stores, or **discharges** the chemical must submit an MSDS to the LEPC. Ask the LEPC or the plant safety manager for help in interpreting the information.

Q. *What is the difference between hazardous chemicals and toxic chemicals?*

A. Hazardous chemicals are a much broader category and may be toxic, **flammable**, **corrosive**, explosive, or environmentally harmful. Substances which are toxic can cause severe illness, poisoning, or death when ingested, inhaled, or absorbed by living organisms. Toxic chemicals are one type of hazardous chemical.

Q. *If I am exposed to a small amount of a* ***toxic chemical*** *once, are my chances of getting cancer the same as someone who is exposed to the chemical everyday?*

A. Generally, no. **Exposure** relates both to the amount and frequency of coming into contact with a specific chemical. Federal agencies have established certain exposure limits for workers that prevent them from becoming ill. Repeated exposure to low levels of a mix of chemicals may be linked to health problems, while a single incident at a higher level may be below a toxic threshold.

Q. *What processes can be used to reduce or eliminate the hazards presented by the storage and transportation of large volumes of hazardous chemicals?*

A. There are some technologies, called continuing or closed-loop processes, that convert hazardous or dangerous compounds into more stable or less **toxic substances** in a single continuous system. That is, some chemicals are immediately converted or recombined in the manufacturing process to reduce **risks** that would otherwise be posed by transportation and storage. Some companies also are using just-in-time delivery to reduce the need to store large volumes of chemicals.

Q. *Where can I go to get more information about chemical risks?*

A. Ask EPA's Office of Research and Development, your LEPC, environmental or consumer activists, or any of several other organizations in the directory at the end of this Guide.

health & environmental risk

Risk is a description of the chance that some hazard to health or the environment will occur. For example, insurance companies commonly use risk to assess the probability that a driver will or will not have an accident. While society has always assessed risk, it was not until recently that risk has been discussed as a policy-making tool for health and environmental issues.

Risk assessment is an evaluation of the potential for a problem to occur and the scientific analysis of its threat to public health and the environment. The evaluation may include toxicology, epidemiology, and exposure data and provides a systematic analysis of risks. While risk assessments are based on science, they are rarely precise, since absolute data almost never exist.

In attempting to control risks, environmental managers examine the options and select those that best reduce risk. Some management decisions may lead to elimination of the risk altogether. Since precise estimates of risk often are not possible, policy makers may use qualitative risk assessments to identify substances or activities that pose a risk to our health and the environment. With good data, quantitative risk assessments can go a step further to identify how much of a substance or activity may cause a harmful effect. For example, exposure to 10 grams of a chemical compound may create a specific health problem, or the loss of 20% of the trees in the Amazon basin may cause a number of severe problems for wildlife.

Risk analysis is used by agencies, industries, and individuals every day to identify health and environmental problems in our society. Regulatory agencies use risk assessment as a tool to evaluate health and safety issues such as food safety and workplace exposure. Chemicals or practices that are identified as very risky receive more management attention then those perceived to be less risky.

Risk communication is the exchange of information between interested parties and is a tool for understanding many environmental risks. To enhance public outreach activi-

ties about risk, EPA is working toward **environmental equity** so that no segment of the population, regardless of race, national origin, or income bears a disproportionate share of **exposure** to environmental pollutants. For information on how agencies use risk assessments regarding specific public hazards, you should call EPA's Office of Policy, Planning, and Evaluation or your state agencies that deal with health and environmental protection.

some questions & answers on health & environmental risk

Q. *Can a risk assessment tell me exactly what to do about a specific hazard?*

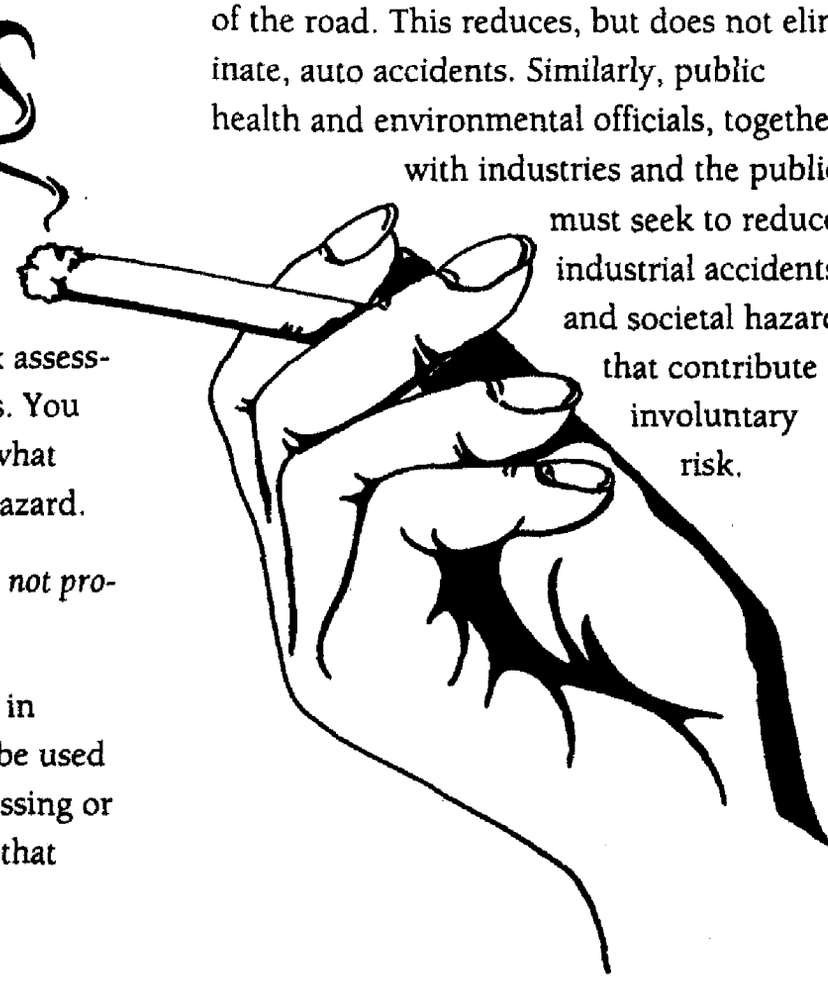
A. No. Risk assessments are often imprecise in that they draw upon available information about the hazard, apply scientific principles, and provide guidance. But risk assessments can help you identify hazards. You can use that information to decide what steps, if any, to take to reduce the hazard.

Q. *Why use risk assessment if it can not provide absolute answers?*

A. Because so many hazards exist in everyday life, risk assessment must be used as a tool for evaluating the most pressing or most hazardous. Over time we find that some activities are more hazardous than once perceived (smoking cigarettes or manufacturing PCBs). Once the evidence is evaluated, these practices may be either stopped or limited. An assessment on an unknown chemical or practice attempts to project what the consequences might be without waiting for final proof.

Q. *Is zero risk possible? Can we eliminate all risk?*

A. No. We live in a world with many risks, both natural and manmade, and many we take voluntarily. We can develop practices that reduce, but not totally eliminate, daily risks. For example, U.S. motor vehicle laws mandate that we drive on the right side of the road. This reduces, but does not eliminate, auto accidents. Similarly, public health and environmental officials, together with industries and the public, must seek to reduce industrial accidents and societal hazards that contribute to involuntary risk.



caught. We use enforcement actions to compel a person or company to comply. These actions include civil and criminal prosecution in courts, administrative orders, and other forms of action that take place after a violation has occurred. Although directed at a specific violator, enforcement causes a deterrent effect that motivates other people to comply.

enforcement

Environmental enforcement is a comprehensive program involving federal, state, local, and tribal governments working together to enforce federal environmental laws. These laws set standards for what individuals and institutions must do to control or prevent **pollution**. Without enforcement, environmental laws would be just words on paper.

The term "enforcement" covers all efforts to encourage compliance with environmental laws. "Compliance" refers to the condition that exists when a person or company fully obeys the law. An environmental law without compliance would mean that pollution problems would continue and grow worse. EPA has an enforcement program to make sure that laws get the results that Congress and the public want.This program will include **environmental justice** concerns in all compliance efforts.

The fundamental aim of enforcement is to convince those who are regulated that it is better to comply quickly than to wait until they are

some questions & answers on health & environmental risk

Q. *Is EPA responsible for every environmental action?*

A. No. Virtually every federal environmental law allows state governments to develop their own programs to carry out the law. When EPA has determined that the state program meets federal requirements, EPA approves the program. Such programs are called "delegated" or "approved" programs. Under this arrangement, the states apply the national standards and regulations by issuing and enforcing their own rules and **permits**. State governments carry out the lion's share of environmental enforcement actions and perform a majority of the inspections.

Q. *What is the enforcement relationship between EPA and the states?*

A. EPA strives to work out an effective enforcement partnership with each state. This is accomplished through enforcement agreements with the separate state agencies. These agreements usually define the characteristics of a good program, using the same criteria by which EPA judges its own performance. The agreements also spell out the circumstances under which EPA will step in and take enforcement action in an approved state program (called "overfiling"). The most common reasons are: the state asked for help; the state's enforcement response was not timely and appropriate (according to EPA guidance); the case involves national precedents; or there is a violation of an EPA order or settlement agreement.

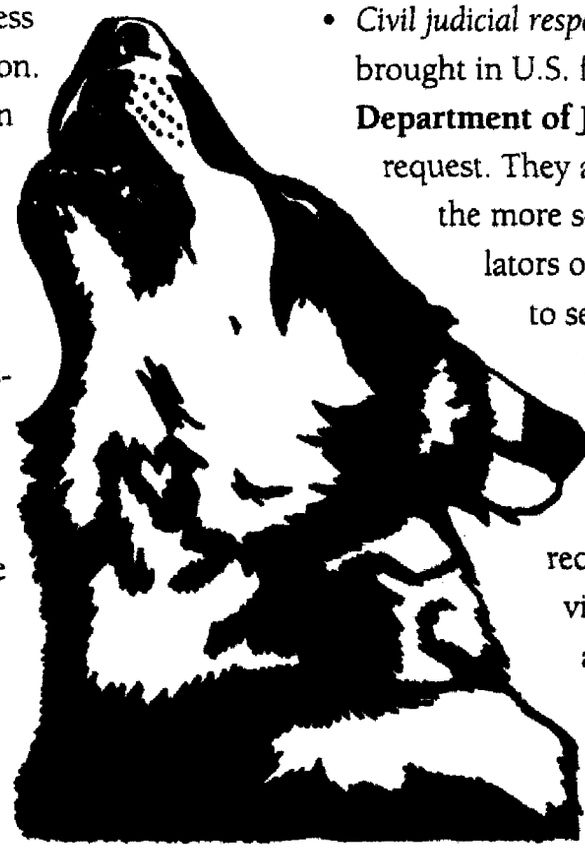
Q. *What is the range of enforcement responses?*

A. EPA's policy is to respond to every violation in some way, and the type of response will be in keeping with the seriousness and circumstances of the violation. EPA has a range of options when contemplating an enforcement response against a violator, and these options differ from one law to another:

- *Informal response*—administrative actions that are advisory in nature, such as a notice of noncompliance or a warning letter. In these actions, EPA advises the manager of a facility what violation was found, what corrective action should be taken, and by what date. Informal responses carry no penalty or power to compel actions, but if they are ignored, they can lead to more severe actions.

- *Formal administrative responses*—legal orders that are independently enforceable, and which may require the recipient to take some corrective or remedial action within a specified period of time, to refrain from certain behavior or to require future compliance. These administrative actions are strong enforcement tools. If a person violates an order, EPA may go to U.S. federal court to force compliance. Administrative actions are handled under EPA's internal administrative litigation system, which is comparable to any court system except that administrative law judges preside.

- *Civil judicial responses*—formal lawsuits brought in U.S. federal court by the **Department of Justice (DOJ)** at EPA's request. They are normally used against the more serious or recalcitrant violators of environmental laws or to seek prompt correction of imminent hazards. Civil judicial cases generally result in penalties and court orders requiring correction of the violation and specific actions to prevent future violations.



- *Criminal judicial responses*—used when a person or company has knowingly and willfully violated the law. In a criminal case, the DOJ prosecutes an alleged violator in federal court, seeking criminal sanctions including fines and imprisonment. Criminal actions are often used to respond to flagrant, intentional disregard for environmental laws (such as "midnight dumping" of **hazardous wastes**) and deliberate falsification of documents or records.

Q. *What happens as a result of an enforcement case?*

A. Most importantly, the enforcement action results in a remedy to the violations, but also serves as a deterrent to others. In many cases, EPA seeks both a remedy and a penalty. These may result from either administrative or judicial cases, and either from a settlement or from a final decision in court or an administrative action. The remedy includes returning the violating facility to compliance and sometimes other remedial actions:

- *Compliance*—the violator will be required to comply with the law. If the violation has not already been corrected, the violator is usually placed under a court-ordered schedule, with severe penalties for failure to comply with the order.

- *Benefit projects*—in some cases, the violator is permitted to carry out a supplemental environmental project that will yield environmental benefits partly offsetting the harmful effects of the violation.

- *Penalties*—the violator is required to pay a cash penalty that is not tax deductible (in criminal cases, a fine). The penalty includes sanctions intended to deter the violator from falling into noncompliance again and to deter others from similar violations.

- *Imprisonment*—in criminal cases, the violator may be sentenced to jail time or placed on probation.

- *Contractor listing*—a facility that has violated the **Clean Water Act** or the **Clean Air Act** may be placed on EPA's List of Violating Facilities. Listed facilities are not eligible to receive federal contracts, grants, or loans from EPA or any other federal agency. Facilities that commit criminal violations of other environmental statutes may be subject to possible suspension and/or debarment from receiving or entering into EPA or other federal agency contracts.

Q. *What is an inspection?*

A. Inspections are the government's main tool for officially assessing compliance. An inspection is an examination into the environmental affairs of a single regulated facility, to determine its compliance with environmental requirements. Inspection findings become the basis for a variety of possible actions EPA might take to bring the facility into compliance.

Q. *How does the EPA decide which facilities to inspect?*

A. While we would like to inspect every regulated facility on a regular basis, we do not have the funds or personnel to do so. As a result, each EPA program has a strategy or policy for allocating inspections to various segments of the regulated community and ultimately to particular facilities. Most inspections are routine, conducted because the facility is within a segment of the regulated community that has been targeted for inspection. Other inspections are "for cause," meaning there is some reason to suspect that an actual violation exists. The stimulus may be a tip, a citizen's complaint, a self-monitoring report, or information from the **Toxic Release Inventory (TRI)**. Inspections may be announced or unannounced.

Q. *Can a citizen file a suit to enforce an environmental standard?*

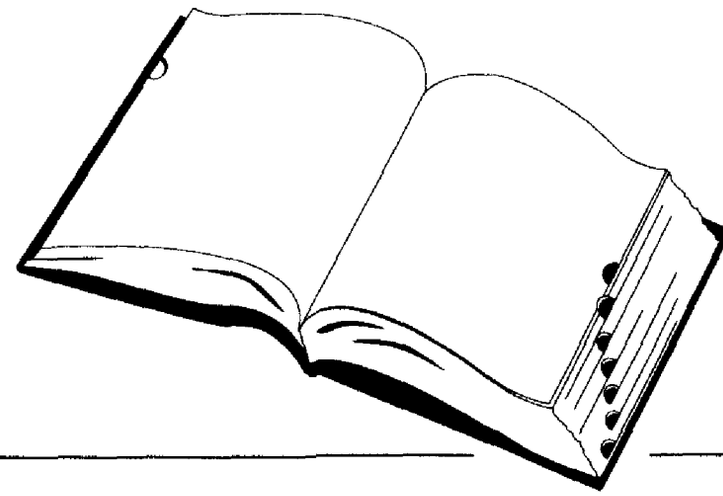
A. Yes. The first citizen suit provision appeared in 1970, when Congress enacted the Clean Air Act. Specifically, this provision allowed citizens to sue polluters who violated certain requirements of the Clean Air Act and to sue the EPA if we failed to carry out a non-discretionary duty set forth in the Act. Since 1970, a citizen suit provision has been included in almost every federal environmental statute. Under these statutes, Congress has granted citizens the power to initiate an enforcement action in federal court in order to ensure adequate protection of the environment. Citizen suits have proven to be an important tool for the enforcement of the various environmental statutes.

Q. *How can I recognize a potential pollution problem?*

A. While some pollution is an unfortunate consequence of modern industrial life, national and state laws limit the amount and kinds of pollution allowed. Sometimes a citizen can easily identify pollution that violates a law and sometimes we need sophisticated equipment. EPA encourages the public to "keep their eyes and ears open" and to contact the appropriate local, state, and federal authorities whenever they notice a potential pollution problem.

Q. *Whom should I contact to report a pollution incident?*

A. State and local governments have responsibility for enforcing most environmental laws in the area where you live. You can locate them through your telephone directory. In most communities, the responsible agency is the city or county health department. At the state level, an environmental agency carries out the pollution control laws, whereas an agriculture agency often handles regulation of **pesticides**. If they are unable to help you, contact the EPA, which principally operates through 10 Regional Offices. The Public Affairs office is a good starting point.



glossary

Acid - A corrosive solution with a **pH** less than 7. Vinegar is a common weak acid; battery acid is much stronger.

Acid Rain - You first need to understand Acid Deposition: a complex chemical and atmospheric phenomenon that occurs when emissions of sulfur and nitrogen compounds and other substances are transformed by chemical processes in the atmosphere, often far from the original sources, and then deposited on earth in either wet or dry form. The wet forms (precipitation) are popularly called "acid rain" and fall as rain, snow, or fog. The dry forms are acidic gases or particulates.

Active Ingredient - In any pesticide product, the component that kills, or otherwise controls, target pests. Pesticides are regulated primarily on the basis of active ingredients.

Activated Sludge Process - A sewage treatment process by which bacteria that feed on organic wastes are continuously circulated and put in contact with organic waste in the presence of oxygen to increase the rate of decomposition.

Acute Effect - An adverse effect on any living **organism** in which severe symptoms develop rapidly and often subside after the exposure stops.

Acute Toxicity - Adverse effects that result from a single **dose** or single **exposure** of a chemical; any poisonous effect produced within a short period of time, usually less than 96 hours. This term normally is used to describe effects in experimental animals.

Administrative Order on Consent - A legal agreement signed by EPA and an individual, business, or other entity through which the violator agrees to pay for correction of violations, take the required corrective or cleanup actions, or refrain from an activity. The order describes the actions to be taken, may be subject to a comment period, applies to civil actions, and can be enforced in court.

Administrative Order - A legal document signed by EPA directing an individual, business, or other entity to take corrective action or refrain from an activity. The order

describes the violations and actions to be taken, and can be enforced in court. Such orders may be issued, for example, as a result of an administrative complaint whereby the respondent is ordered to pay a penalty for violations of a statute.

Administrative Record - All documents which EPA considered or relied on in selecting the remedy at a Superfund site, culminating in the record of decision for remedial action, or an action memorandum for removal actions.

Aeration - The act of mixing a liquid with air (oxygen).

Aerobic - A biological process that occurs in the presence of oxygen.

Agricultural Waste - Poultry and livestock manure, and residual materials in liquid or solid form generated from the production and marketing of poultry, livestock, furbearing animals, and their products. Also includes grain, vegetable, and fruit harvest residue.

Air Quality Standards - The level of selected pollutants set by law that may not be exceeded in outside air. Used to determine the amount of pollutants that may be emitted by industry.

Alar - Trade name for daminozide, a **pesticide** that makes apples redder, firmer, and less likely to drop off trees before growers are ready to pick them. Alar also is used to a lesser extent on peanuts, tart cherries, concord grapes, and other fruits.

Alkalinity - Having the properties of a base with a **pH** of more than 7. A common alkaline is baking soda.

Ambient - Any unconfined portion of the atmosphere; open air; outside surrounding air.

Anaerobic - A biological process which occurs in the absence of oxygen.

Aquifer - A water-bearing layer of rock (including gravel and sand) that will yield water in usable quantity to a well or spring.

Asbestos - A mineral fiber that can pollute air or water and cause cancer or asbestosis when inhaled. EPA has banned or severely restricted the use of asbestos in manufacturing and construction.

Assimilative Capacity - The ability of a natural body of water to receive wastewaters or toxic materials without harmful effects and without damage to aquatic life.

Bactericide - A **pesticide** used to control or destroy bacteria, typically in the home, schools, or on hospital equipment.

Benthic Organism - Any of a diverse group of aquatic plants and animals that lives on the bottom of marine and fresh bodies of water. The presence or absence of certain benthic organisms can be used as an indicator of water quality.

Best Available Control Technology (BACT) The application of the most advanced methods, systems, and techniques for eliminating or minimizing **discharges** and **emissions** on a case-by-case basis as determined by **EPA.** BACT represents an emission limit based on the maximum degree of reduction of each pollutant as described in regulations under the **Clean Air Act (CAA)**. The determination of **BACT** takes into account energy, environmental, economic effects, and other costs.

Best Available Technology Economically Achievable (BATEA) - Originally described under Section 304(b)(2)(B) of the **Clean Water Act**, this level of control is generally described as the best technology currently in use and includes controls on toxic pollutants.

Best Management Practices (BMP) - Procedures or controls other than **effluent limitations** to prevent or reduce **pollution** of **surface water** (includes runoff control, spill prevention, and operating procedures).

Bioaccumulation/Biomagnification - A process where chemicals are retained in fatty body tissue and increase in concentration over time. Biomagnification is the increase of tissue accumulation in species higher in the natural food chain as contaminated food species are eaten.

Bioassay - A method of testing a material's effects on living **organisms**.

Biochemicals - Chemicals that are either naturally occurring or identical to naturally occurring substances. Examples include hormones, pheromones, and enzymes. Biochemicals function as pesticides through non-toxic, non-lethal modes of action, such as disrupting the mating pattern of insects, regulating growth, or acting as repellants. Biochemicals tend to be environmentally compatible and are thus important to **Integrated Pest Management** programs.

Biochemical Oxygen Demand (BOD) - A measure of the oxygen required to break down organic materials in water. Higher organic loads require larger amounts of oxygen and may reduce the amount of oxygen available for fish and aquatic life below acceptable levels.

Biodegradable - The ability of a substance to be broken down physically and/or chemically by microorganisms. For example, many chemicals, food scraps, cotton, wool, and paper are bio-degradable; plastics and polyester generally are not.

Biodiversity - The number and variety of different **organisms** in the ecological complexes in which they naturally occur. Organisms are organized at many levels, ranging from complete **ecosystems** to the biochemical structures that are the molecular basis of heredity. Thus, the term encompasses different ecosystems, species, and genes that must be present for a healthy environment. A large number of

species must characterize the food chain, representing multiple predator-prey relationships.

Biological pesticides - Certain microorganisms, including bacteria, fungi, viruses, and protozoa that are effective in controlling target pests. These agents usually do not have toxic effects on animals and people and do not leave toxic or persistent chemical residues in the environment.

Bioremediation - The use of living **organisms** (e.g., bacteria) to clean up oil spills or remove other pollutants from soil, water, and wastewater.

Biota - All living **organisms** in a given area.

Boom - (1) A floating device used to contain oil on a body of water. (2) A piece of equipment used to apply **pesticides** from a tractor or truck.

Bubble (Bubble Policy) - Existing sources of air pollution with several facilities may control more than is required at one **emission** point where control costs are lower, in return for comparable relaxation at a second point where costs are higher or more difficult to achieve.

By-product - Materials, other than the intended product, generated as a result of an industrial process.

Cap - A fairly impermeable seal, usually composed of clay-type soil or a combination of clay soil and synthetic **liner**, which is placed over a **landfill** during **closure**. The cap serves to minimize **leachate** volume during **biodegradation** of the waste by keeping precipitation from percolating through the **landfill**. The cap also keeps odors down and animal scavengers from gathering.

Capacity Assurance Plan - A plan which assures that a state has the ability to treat and dispose of hazardous wastes generated within its borders over the next 20 years. Section 104 of **SARA** required the first plan to be submitted to EPA in October 1989. But even though capacity has been certified, the state is not required to treat or dispose of hazardous wastes at home; many are exporting to other states that have commercial facilities, permitted landfills, and **incinerators**. See Law section.

Carcinogenic or Carcinogen - Capable of causing cancer. A suspected carcinogen is a substance that may cause cancer in humans or animals but for which the evidence is not conclusive.

CERCLIS (Pronounced SERK-liss) - The federal Comprehensive Environmental Response, Compensation, and Liability Information System. This database includes all sites which have been nominated for investigation by the **Superfund** program and the actions that have been taken at these sites. If the site investigation reveals contamination, the site is ranked and may be included on the **National Priorities List** for **Superfund** cleanup. Inclusion in

the CERCLIS database does not necessarily mean that a property is a **hazardous waste** site. An emergency action may have been conducted there or a simple investigation which concluded that no further action was required.

Chemical Abstract Service (CAS) - Since the 1890s, CAS has been assigning identification numbers to chemicals that companies register with them. Every year, CAS updates and writes new chemical abstracts on well over a million different chemicals, including their composition, structure, characteristics, and all the different names of that chemical. CAS On-Line is a computer network available to individual and business account holders to receive information about specific chemicals of concern. Each abstract is accompanied by the CAS number.

Chemical Oxygen Demand (COD) - A measure of the oxygen-consuming capacity of inorganic and organic matter present in water or wastewater; the amount of oxygen consumed from a chemical **oxidant** in a specific test.

Chlorination - Adding chlorine to water or wastewater, generally for the purpose of disinfection, but frequently for accomplishing other biological or chemical results. Chlorine also is used almost universally in manufacturing processes, particularly for the plastics industry.

Chlorofluorocarbons (CFCs) - A family of chemicals commonly used in air conditioners and refrigerators as coolants and also as solvents and aerosol propellants. CFCs drift into the upper atmosphere where their chlorine components destroy **ozone**. CFCs are thought to be a major cause of the ozone hole over Antarctica.

Chronic Effect - An adverse effect on any living organism in which symptoms develop slowly over a long period of time or recur frequently.

Clear Cut - Harvesting all the trees in one area at one time, a practice that destroys vital habitat and biodiversity and encourages rainfall or snowmelt runoff, erosion, sedimentation of streams and lakes, and flooding.

Cloning - In biotechnology, obtaining a group of genetically identical cells from a single cell; making identical copies of a gene.

Climate Change - this term is commonly used interchangeably with "global warming" and "the greenhouse effect," but is a more descriptive term. Climate change refers to the buildup of man-made gases in the atmosphere that trap the sun's heat, causing changes in weather patterns on a global scale. The effects include changes in rainfall patterns, sea level rise, potential droughts, habitat loss, and heat stress. The greenhouse gases of most concern are carbon dioxide, methane, and nitrous oxides. If these gases in our atmosphere double, the earth could warm up by 1.5 to 4.5 degrees by the year 2050, with changes in global precipitation having the greatest consequences.

Closure - The procedure an operator must go through when a **landfill** reaches the legal capacity for **solid waste**. No more waste can be accepted and a **cap** usually is placed over the site. The cap is then planted with grasses and other ground covers. Post-closure care includes monitoring ground water, landfill gases, and **leachate** collection systems, sometimes for as long as 30 years.

Code of Federal Regulations (CFR) - A periodic publication of the regulations established by U.S. law.

Commercial Waste - All solid waste from businesses. This category includes, but is not limited to, solid waste originating in stores, markets, office buildings, restaurants, shopping centers, and theaters.

Commercial Waste Management Facility - A treatment, storage, disposal, or transfer facility that accepts wastes from a variety of sources for profit. A commercial facility manages a broader spectrum of wastes than a private facility, which normally manages a limited volume or type of waste.

Community Relations - Two-way communications with the public to foster understanding of EPA programs and actions and to increase citizen input into EPA decisions. Specific community relations activities such as holding public meetings and comment periods and opening information repositories are required at **Superfund** sites.

Compost - Decomposed organic material that is produced when bacteria in soil break down **garbage** and **biodegradable** trash, making organic fertilizer. Making compost requires turning and mixing and exposing the materials to air. Gardeners and farmers use compost for soil enrichment.

Concentration - The relative amount of a substance mixed with another substance. An example is five **parts per million** of carbon monoxide in air or 1 **milligram/liter** of iron in water.

Conditionally Exempt Generators - Small quantity facilities that produce fewer than 220 pounds of hazardous waste per month. Exempt from most regulations, conditionally exempt generators are required to determine whether their waste is hazardous and to notify local waste management agencies. These generators may treat or dispose of the waste **on site** or ensure that the waste is sent to a permitted disposal or recycling facility.

Cone of Depression - A lowering in the **water table** that develops around a pumped well.

Construction and Demolition Waste - Waste building materials, dredging materials, tree stumps, and rubble resulting from construction, remodeling, repair, and demolition operations on houses, commercial buildings and other structures, and pavements. May contain lead, asbestos, or other hazardous materials.

Corrosive - A substance that eats or wears away materials gradually by chemical action.

Consent Decree - A legal document submitted by the **Department of Justice** on behalf of the EPA for approval by a federal judge to settle a case. A consent decree can be used to formalize an agreement reached between EPA and potentially responsible parties (PRPs) for cleanup at a **Superfund** site. Consent decrees also are signed by regulated facilities to cease or correct certains actions or processes that are polluting the environment and include payment of penalties. The **Clean Water Act, Clean Air Act, Toxic Substances Control Act**, and others all use consent decrees.

Conservation - Preserving and renewing natural resources to assure their highest economic or social benefit over the longest period of time. Clean rivers and lakes, wilderness areas, a diverse wildlife population, healthy soil, and clean air are natural resources worth conserving for future generations.

Continuous Discharge - A permitted release of pollutants into the environment that occurs without interruption, except for infrequent shutdowns for maintenance, process changes, etc.

Controlled Reaction - A chemical reaction at temperature and pressure conditions that are maintained within safe limits to produce a desired product.

County Emergency Operations Plan - A plan required by **Federal Emergency Management Agency** regulations that describes actions the county will take to respond to emergency situations such as natural disasters, major fires, transportation incidents, or chemical releases.

Covered Facility - A facility having one or more of the 366+ **extremely hazardous substances** in amounts higher than the quantity designated by **EPCRA**. These facilities must file reports with the **SERC** and **LEPC**.

Cradle-to-Grave or Manifest System - A procedure in which **hazardous wastes** are identified as they are produced and are followed through further treatment, transportation, and disposal by a series of permanent, linkable, descriptive documents.

Criteria - Descriptive factors taken into account by EPA in setting standards for pollutants. For example, water quality criteria describe the **concentration** of pollutants that most fish can be exposed to for an hour without showing **acute effects**.

Dechlorination - Removal of chlorine and chemical replacement with hydrogen or hydroxide ions to detoxify a substance.

Deep Well Injection - A process by which waste fluids are injected deep below the surface of the earth.

Delist - Use of the petition process (1) to have a chemical's toxic designation rescinded; (2) to remove a site from the **National Priority List**; or (3) to exclude a particular waste from regulation even though it is a listed hazardous waste.

Destruction and Removal Efficiency (DRE) - a percentage that represents the number of molecules of a compound removed or destroyed in an **incinerator**. A DRE of 99.99% means that 9,999 molecules are destroyed for every 10,000 that enter.

Discharge - The release of any waste into the environment from a **point source**. Usually refers to the release of a liquid waste into a body of water through an outlet such as a pipe, but also refers to air **emissions**.

Discharge Area - An area of land where there is a net annual transfer of water from the **ground water** to **surface water**, such as to streams, springs, lakes, and wetlands.

Dispersion Model - A mathematical prediction of how pollutants from a **discharge** or **emission** source will be distributed in the surrounding environment under given conditions of wind, temperature, humidity, and other environmental factors.

Disposal - The **discharge**, deposit, injection, dumping, spilling, leaking, or placing of any **solid waste** or **hazardous waste** into the environment (land, **surface water, ground water,** and air).

Disposal Facility - A **landfill, incinerator**, or other facility which receives waste for **disposal.** The facility may have one or many disposal methods available for use. Does not include wastewater treatment.

Dissolved Oxygen (DO) - Oxygen that is freely available in water to sustain the lives of fish and other aquatic **organisms**.

Dose - In terms of monitoring **exposure** levels, the amount of a **toxic substance** taken into the body over a given period of time.

Dose Response - How an **organism's** response to a **toxic substance** changes as its overall **exposure** to the substance changes. For example, a small dose of carbon monoxide may cause drowsiness; a large **dose** can be fatal.

Dump - A land site where wastes are discarded in a disorderly or haphazard fashion without regard to protecting the environment. Uncontrolled dumping is an indiscriminate and illegal form of waste **disposal**. Problems associated with dumps include multiplication of disease-carrying organisms and pests, fires, air and water pollution, unsightliness, loss of habitat, and personal injury.

Emergency Broadcasting System (EBS) - Used to inform the public about an emergency and the protective actions to take. The EBS is a service of local radio and television stations, activated as needed and approved by a local emergency management agency.

Ecology - The study of the relationships between all living **organisms** and the environment, especially the totality or pattern of interactions; a view that includes all plant and animal species and their unique contributions to a particular habitat.

Ecosystem - The interacting **synergism** of all living **organisms** in a particular environment; every plant, insect, aquatic animal, bird, or land species that forms a complex web of interdependency. An action taken at any level in the food chain, use of a **pesticide** for example, has a potential domino effect on every other occupant of that system.

Effluent - Wastewater **discharged** from a **point source**, such as a pipe.

Effluent Guidelines - Technical documents developed by EPA which set **discharge** limits for particular types of industries and specific pollutants.

Effluent Limitations - Limits on the amounts of pollutants which may be **discharged** by a facility; these limits are calculated so that **water quality standards** will not be violated even at low stream flows.

Emergency and Hazardous Chemical Inventory - An annual report by facilities having one or more **extremely hazardous substances** or hazardous chemicals above certain weight limits, as specified in Section 311 and 312 of **EPCRA**.

Emergency Preparedness Coordinator - The local government official designated to be notified immediately of chemical emergencies (e.g., spills, chemical releases, explosions, or fires) under **EPCRA**.

Emission - The release or **discharge** of a substance into the environment. Generally refers to the release of gases or **particulates** into the air.

Emission Standards - Government standards that establish limits on **discharges** of pollutants into the environment (usually in reference to air).

Endangered Species - Animals, plants, birds, fish, or other living **organisms** threatened with extinction by man-made or natural changes in the environment.

Energy Recovery - To capture energy from waste through any of a variety of processes (e.g., burning). Many new technology **incinerators** are waste-to-energy recovery units.

Environmental Assessment (EA) - A preliminary, written, environmental analysis required by **NEPA** (see the Federal Law section) to determine whether a federal activity such as building airports or highways would significantly affect the environment; may require preparation of more detailed **Environmental Impact Statement**.

Environmental Audit - An independent assessment (not conducted by EPA) of a facili-

ty's compliance policies, practices, and controls. Many **pollution prevention** initiatives require an audit to determine where wastes may be reduced or eliminated or energy conserved. Many supplemental environmental projects that offset a penalty use audits to identify ways to reduce the harmful effects of a violation.

Environmental Equity - Equal protection from environmental hazards for individuals, groups, or communities regardless of race, ethnicity, or economic status.

Environmental Impact Statement (EIS) - A document prepared by or for EPA which identifies and analyzes, in detail, environmental impacts of a proposed action. As a tool for decision-making, the EIS describes positive and negative effects and lists alternatives for an undertaking, such as development of a wilderness area. (Required by **NEPA** — see Federal Law Section).

Environmental Justice - The fair treatment of people of all races, cultures, incomes, and educational levels with respect to the development and enforcement of environmental laws, regulations, and policies. Fair treatment implies that no population should be forced to shoulder a disproportionate share of exposure to the negative effects of pollution due to lack of political or economic strength.

Environmental Response Team (ERT) - EPA's group of highly trained scientists and engineers based in Edison, NJ and Cincinnati, OH who back up the federal **On-Scene Coordinator**. The ERT's capabilities include multimedia sampling and analysis, hazard assessment, hazardous substance and oil spill cleanup techniques, and technical support.

Epidemiologist - A medical scientist who studies the various factors involved in the incidence, distribution, and control of disease in a population.

Erosion - The wearing away of soil by wind or water, intensified by land-clearing practices related to farming, residential or industrial development, road building, or logging.

Estuary - A complex ecosystem between a river and near-shore ocean waters where fresh and salt water mix. These brackish areas include bays, mouths of rivers, salt marshes, **wetlands**, and lagoons and are influenced by tides and currents. Estuaries provide valuable habitat for marine animals, birds, and other wildlife.

Explosive Limits (chemical) - The amounts of **vapor** in air that form explosive mixtures. These limits are expressed as lower and upper values and give the range of vapor concentrations in air that will explode if an ignition source is present.

Exposure - Radiation or pollutants that come into contact with the body and present a potential health threat. The most common routes of **exposure** are through the skin, mouth, or by inhalation.

Extremely Hazardous Substances (EHS) - Any of 366 (+ or -) chemicals or hazardous substances identified by **EPA** on the basis of hazard or toxicity and listed under **EPCRA.** The list is periodically revised.

Fecal Coliform Bacteria - Found in the intestinal tracts of mammals, this bacteria in water or sludge is an indicator of pollution and possible contamination by pathogens.

Feedstock - Raw material supplied to a machine or processing plant from which other products can be made. For example, polyvinyl chloride and polyethylene are raw chemicals used to produce plastic tiles, mats, fenders, cushions, and traffic cones.

Financial Assurance - A means (such as insurance, guarantee, surety bond, letter of credit, or qualification as a self-insurer) by the operator of a facility such as a **landfill** to assure financial capability for cleaning up possible environmental releases and **closure** of that facility.

First Draw - The water that comes out when a faucet in the kitchen or bathroom is first opened, which is likely to have the highest level of lead contamination from old plumbing solder and pipes.

Flammable - Describes any material that can be ignited easily and that will burn rapidly.

Flare - A device that burns gaseous materials to prevent them from being released into the environment. Flares may operate continuously or intermittently and are usually found on top of a stack. Flares also burn off methane gas in a landfill.

Flash Point - The lowest temperature at which evaporation of a substance produces enough **vapor** to form an ignitable mixture with air.

Floodplain - Mostly level land along rivers and streams that may be submerged by floodwater. A 100-year floodplain is an area which can be expected to flood once in every 100 years.

Flue Gas Desulfurization - The removal of sulfur oxides from exhaust gases of a boiler or industrial process; usually a wet **scrubbing** operation which concentrates hazardous materials in a slurry, requiring proper **disposal**.

Fugitive Emissions - Air pollutants released to the air other than those from stacks or vents; typically small releases from leaks in plant equipment such as valves, pump seals, flanges, sampling connections, etc.

Fungicide - A **pesticide** used to control or destroy fungi on food or grain crops.

Garbage - Food waste (animal and vegetable) resulting from the handling, storage, packaging, sale, preparation, cooking, and serving of foods.

General Reporting Facility - A facility having one or more hazardous chemicals above

the 10,000-pound Threshold Planning Quantity. These facilities must file **Material Safety Data Sheets** and emergency inventory information with the **SERC**, **LEPC**, and local fire departments.

Generator - A facility or mobile source that emits pollutants into the air; any person who produces a hazardous waste that is listed by EPA and therefore subject to regulation.

Genetic Engineering - A process of inserting new genetic information into existing cells in order to modify an **organism** for the purpose of changing particular characteristics.

Global Warming - See definition for **Climate Change**.

Grab Sample - A single sample of soil or of water taken without regard to time or flow.

Greenhouse Effect - See definition for **Climate Change**.

Ground Water - Water found below the surface of the land, usually in porous rock formations. Ground water is the source of water found in wells and springs and is used frequently for drinking.

Hazard Communication Standard - An **OSHA** regulation that requires chemical manufacturers, suppliers, and importers to assess the hazards of the chemicals they make, supply, or import, and to inform employers, customers, and workers of these hazards through a **Material Safety Data Sheet**.

Hazardous Chemical - EPA's designation for any hazardous material that requires a **Material Safety Data Sheet**. Such substances are capable of producing adverse physical effects (fire, explosion, etc.) or adverse health effects (cancer, dermatitis, etc.)

Hazardous Waste - A subset of **solid wastes** that pose substantial or potential threats to public health or the environment and meet any of the following criteria:

- is specifically listed as a hazardous waste by EPA;
- exhibits one or more of the characteristics of hazardous wastes (ignitability, **corrosiveness**, **reactivity**, and/or toxicity);
- is generated by the treatment of hazardous waste; or is contained in a hazardous waste.

Hazardous Waste Landfill - A specially permitted, excavated or engineered area in which **hazardous waste** is deposited and covered. Proper protection of the environment from the materials to be deposited in such a **landfill** requires careful site selection, the cataloging of types of wastes, good design (including a liner and a **leachate** collection and treatment system), proper operation, and thorough final **closure**.

Health Assessment - An evaluation of available data on existing or potential risks posed by a Superfund site. Every site on the National Priorities List has a health assessment prepared by the **Agency for Toxic Substances and Disease Registry** (see Government Agency section).

Heavy Metal - A common **hazardous waste**; can damage **organisms** at low **concentrations** and tends to accumulate in the food chain.

Herbicide - A **pesticide** designed to control or kill plants, weeds, or grasses. Almost 70% of all pesticide used by farmers and ranchers are herbicides. These chemicals have wide-ranging effects on non-target species (other than those the pesticide is meant to control).

Household or **Domestic Waste** - **Solid waste**, composed of **garbage** and rubbish, which normally originates from residential, private households, or apartment buildings. Domestic waste may contain a significant amount of toxic or **hazardous waste** from improperly discarded **pesticides**, paints, batteries, and cleaners.

Hydraulic Gradient - The direction of **ground water** flow due to changes in the depth of the **water table**.

Hydrocarbons - Chemicals that consist entirely of hydrogen and carbon. Hydrocarbons contribute to air pollution problems like **smog**.

Identification Code or EPA I.D. Number - The unique code assigned to each **generator**, transporter, and treatment, storage, or **disposal** facility by EPA to facilitate identification and tracking of **hazardous waste**. **Superfund** sites also have assigned I.D. numbers.

Impoundment - A body of water or **sludge** confined by a dam, dike, floodgate, or other barrier.

Incident Command System (ICS) - An organizational scheme wherein one person, normally the Fire Chief, takes charge of an integrated, comprehensive emergency response. This commander is backed by an Emergency Operations Center which provides support, resources, communications, and advice.

Incineration - The destruction of solid, liquid, or gaseous wastes by controlled burning at high temperatures. Hazardous organic compounds are converted to ash, carbon dioxide, and water. Burning destroys organics, reduces the volume of waste, and vaporizes water and other liquids the wastes may contain. The residue ash produced may contain some hazardous material, such as non-combustible **heavy metals**, concentrated from the original waste.

Incinerator - A furnace for the routine burning of waste materials using controlled flame combustion.

Incompatible Waste - A waste unsuitable for mixing with another waste or material because of **reactivity** hazards.

Indirect Discharge - The introduction of pollutants from a non-domestic source into a publicly owned wastewater treatment system. Indirect dischargers can be commercial or industrial facilities who must pre-treat their wastes before **discharge** into local sewers.

Indoor Air - Breathing air inside a habitable structure, often highly polluted because of lack of exchange with fresh oxygen from outdoors. Solvents, smoke, paints, furniture

glues, carpet padding, and other synthetic chemicals trapped inside contribute to an often unhealthy environment.

Industrial Waste - Unwanted materials produced in or eliminated from an industrial operation and categorized under a variety of headings, such as liquid wastes, **sludge**, **solid wastes**, and **hazardous wastes**.

Inert ingredients - Substances that are not "active," such as water, petroleum distillates, talc, corn meal, or soaps. When discussing **pesticides**, inert ingredients do not attack a particular pest, but some are chemically or biologically active, causing health and environmental problems.

Infectious Waste - See definition for **Medical Waste**.

Innovative Technology - New or inventive methods to treat **hazardous wastes**, conserve energy, or prevent **pollution**.

Insecticide - A **pesticide** compound specifically used to kill or prevent the growth of insects.

Integrated Pest Management (IPM) - A combination of biological, cultural, and genetic pest control methods with use of **pesticides** as the last resort. IPM considers a targeted species' life cycle and intervenes in reproduction, growth, or development to reduce the population. Land use practices are examined for possible change; other animals, birds, or reptiles in the ecosystem are used as natural predators.

Interstate Commerce - A clause of the United States Constitution which reserves to the federal government the right to regulate the conduct of business across state lines. Under this clause, the U.S. Supreme Court has ruled that states may not restrict the **disposal** of wastes originating out-of-state more than that of waste originating in-state.

Inversion - An atmospheric condition caused by increasing temperature with elevation, resulting in a layer of warm air preventing the rise of cooler air trapped beneath. This condition prevents the rise of pollutants that might otherwise be dispersed. Trapping pollutants near the ground increases **ozone** to harmful levels.

Irradiated Food - Food that has been briefly exposed to radioactivity (usually gamma rays) to kill insects, bacteria, and mold. Irradiated food can be stored without refrigeration or chemical preservatives and has a long "shelf life."

Irritant - A substance that can cause irritation of the skin, eyes, or respiratory system. An irritant can cause an **acute effect** from a single high-level **exposure**, or **chronic effects** from repeated, low-level exposures. Some examples of irritants are chlorine, nitric acid, and various **pesticides**.

Karst - A geologic formation of irregular limestone deposits with sinks, underground streams, and caverns.

Lagoon - A shallow, artificial treatment pond where sunlight, bacterial action, and oxygen work to purify wastewater; a stabilization pond. An aerated lagoon is a treatment pond that uses oxygen to speed up the natural process of biological decomposition of organic wastes. A lagoon is regulated as a **point source** under the **Clean Water Act** if there is a direct surface water discharge. Some lagoons that discharge into **ground water** also are regulated if they have a direct hydrogeologic connection to surface water. In other areas, lagoons were historically used to dump various liquid, **solid, and hazardous wastes** from manufacturing or industrial processes. These wastes typically flooded and polluted surrounding environs or seeped underground. Such lagoons are now regulated under **RCRA** but some must be cleaned up under **Superfund**.

Land Disposal Restrictions (Land Ban) - Mandated by the 1984 amendments to **RCRA**; prohibits the disposal of hazardous wastes into or on the land.

Landfill - A method for final **disposal** of **solid waste** on land. The refuse is spread and compacted and a cover of soil applied so that effects on the environment (including public health and safety) are minimized. Under current regulations, landfills are required to have liners and **leachate** treatment systems to prevent contamination of **ground water** and **surface waters**. An industrial landfill disposes of non-hazardous **industrial wastes**. A municipal landfill disposes of domestic waste including **garbage**, paper, etc. This waste may include toxins that are used in the home, such as insect sprays and powders, engine oil, paints, solvents, and weed killers.

Large Quantity Generator - Person or facility which generates more than 2,200 pounds of **hazardous waste** per month. In 1989, only 1% of more than 20,000 **generators** fell into this category. Those generators produced nearly 97% of the nation's hazardous waste. These generators are subject to all requirements of **RCRA**.

Leachate - Liquid (mainly water) that percolates through a **landfill** and has picked up dissolved, suspended, and/or microbial contaminants from the waste. Leachate can be compared to coffee: water that has percolated down through the ground coffee.

Lethal Concentration 50 (LC 50) - A **concentration** of a pollutant or **effluent** at which 50% of the test **organisms** die; a common measure of **acute toxicity**.

Lethal Dose 50 (LD 50) - The **dose** of a toxicant that will kill 50% of test organisms within a designated period of time. The lower the LD 50, the more toxic the compound.

Limited Degradation - A policy that allows for some lowering of natural environmental quality to a given level beneath an established health standard.

Liner - Structure of natural clay or manufactured material (plastic) which serves as a barrier to restrict **leachate** from reaching or mixing with **ground water** in **landfills**, **lagoons**, etc.

Litter - The highly visible portion of **solid waste** (usually packaging material) which is generated by the consumer and carelessly discarded outside of the regular **garbage** disposal system, as on the highways or in streets.

Local Emergency Planning Committee (LEPC) - The body appointed by the State Emergency Response Commission **(SERC)**, as required by **EPCRA**, which develops comprehensive emergency plans for Local Emergency Planning Districts, collects **MSDS** forms and chemical release reports, and provides this information to the public. Each county and some large city governments participate in an **LEPC**.

Manifest System - Tracking of **hazardous waste** from "cradle to grave" (generation through **disposal**), with accompanying documents known as "manifests."

Material Safety Data Sheet (MSDS) - Printed material concerning a **hazardous chemical**, or **Extremely Hazardous Substance**, including its physical properties, hazards to personnel, fire and explosion potential, safe handling recommendations, health effects, fire fighting techniques, **reactivity**, and proper **disposal**. Originally established for employee safety by **OSHA**.

Maximum Achievable Control Technology (MACT) - Generally, the best available control technology, taking into account cost and technical feasibility.

Maximum Contaminant Level (MCL) - The maximum level of certain contaminants permitted in drinking water supplied by a **public water system** as set by EPA under the federal **Safe Drinking Water Act.**

Maximum Contaminant Level Goal (MCLG) - The maximum level of a contaminant that is associated with no adverse health effects from drinking water containing that contaminant over a lifetime. For chemicals believed to cause cancer, the MCLGs are set at zero. MCLGs are not enforceable, but are ideal, health-based goals which are set in the National Primary Drinking Water Standards developed by EPA. **MCLs** are set as close to MCLGs as possible, considering costs and technology.

Medical Waste - All wastes from hospitals, clinics, or other health care facilities ("Red Bag Waste") that contain or have come into contact with diseased tissues or infectious **microorganisms**. Also referred to as infectious waste which is **hazardous waste** with infectious characteristics, including: contaminated animal waste, human blood and blood products, pathological waste, and discarded sharps (needles, scalpels, or broken medical instruments).

Microorganisms - Bacteria, yeasts, simple fungi, algae, protozoans, and a number of

other organisms that are microscopic in size. Most are beneficial but some produce disease. Others are involved in composting and sewage treatment.

Milligrams/liter (mg/l) - A measure of **concentration** used in the measurement of fluids. Mg/l is the most common way to present a concentration in water and is roughly equivalent to **parts per million**.

Minimization - Measures or techniques that reduce the amount of wastes generated during industrial production processes; this term also is applied to **recycling** and other efforts to reduce the volume of waste going to **landfills**. This term is interchangeable with waste reduction and waste minimization.

Mitigation - Measures taken to reduce adverse effects on the environment.

Monitoring Well - A well used to take water quality samples or to measure **ground water** levels.

Morbidity - Rate of incidence of disease.

Mortality - Death rate.

Mutagenicity - The property of a chemical that causes the genetic characteristics of an **organism** to change in such a way that future generations are permanently affected.

National Ambient Air Quality Standards (NAAQS) - Maximum air pollutant standards that EPA set under the **Clean Air Act** for attainment by each state. The standards were to be achieved by 1975, along with state implementation plans to control industrial sources in each state.

National Emissions Standards for Hazardous Air Pollutants (NESHAP) - **Emission** standards set by EPA for an air pollutant not covered by **NAAQS** that may cause an increase in deaths or serious, irreversible, or incapacitating illness. Primary standards are designed to protect human health, secondary standards to protect public welfare.

National Pollutant Discharge Elimination System (NPDES) - The primary permitting program under the **Clean Water Act** which regulates all **discharges** to **surface water**.

National Priorities List (NPL) - A list of sites, many nominated by the states, for **hazardous waste** cleanup under **Superfund**.

National Response Center (NRC) - The primary communications center operated by the U.S. Coast Guard to receive reports of major chemical and oil spills and other hazardous substances into the environment. The NRC immediately relays reports to a predesignated federal **On-Scene Coordinator**.

National Response Team (NRT) - Representatives from 15 federal agencies with interests and expertise in various aspects of emergency response to pollution incidents. EPA serves as chair and the U.S. Coast Guard serves as vice-chair. The NRT is primarily a national plan-

ning, policy, and coordinating body and does not respond directly to incidents. The NRT provides policy guidance prior to an incident and assistance as requested by a federal **On-Scene Coordinator** via a **Regional Response Team** during an incident. NRT assistance usually takes the form of technical advice, access to additional resources or equipment, or coordination with other RRTs.

National Strike Force (NSF) - Operated by the U.S. Coast Guard, the NSF is composed of three strategically located teams (Atlantic, Pacific, and Gulf coasts) who back up the federal **On-Scene Coordinator**. These teams are extensively trained and equipped to respond to major oil spills and chemical releases. These capabilities are especially suited to incidents in a marine environment but also include site assessment, safety, action plan development, and documentation for both inland and coastal zone incidents. The NSF Coordination Center is at Elizabeth City, NC.

Neutralization - The chemical process in which the **acidic** or basic characteristics of a fluid are changed to those of water (**pH** = 7).

Non-Attainment - Refers to areas of the United States that have not met air standards for human health by deadlines set in the **Clean Air Act**.

Non-Contact Cooling Water - Water used for cooling which does not come into direct contact with any raw material, product, **by-product**, or waste.

Non-Degradation - A policy that forbids any lowering of naturally occurring environmental quality regardless of established health standards.

Nonpoint Source - Any source of **pollution** not associated with a distinct **discharge** point. Includes sources such as rainwater, runoff from agricultural lands, industrial sites, parking lots, and timber operations, as well as escaping gases from pipes and fittings.

No Observed Adverse Effect Level or **No Observed Effect Level (NOAEL)** or **(NOEL)** A level of **exposure** which does not cause observable harm.

Odor Threshold - The lowest **concentration** of a substance in air that can be smelled. Odor thresholds are highly variable because of the differing ability of individuals to detect odors.

On-Scene Coordinator (OSC) - The federal official responsible for the coordination of a hazardous materials response action, as specified in individual Regional Contingency Plans. OSCs are predesignated by EPA for inland areas and by the U.S. Coast Guard for coastal areas. The OSC coordinates all federal containment, removal, and disposal efforts and resources during a pollution incident. The OSC is the point of contact for the coordination of federal efforts with those of the local response community. The OSC has access to extensive federal resources, including the **National**

Strike Force, the **Environmental Response Team**, and **Scientific Support Coordinators**. The OSC can be a source of valuable support and information to the community.

On Site - On the same, or adjacent, property.

Organically Grown - Food, feed crops, and livestock grown within an intentionally-diversified, self-sustaining agro-ecosystem. In practice, farmers build up nutrients in the soil using **compost**, agricultural wastes, and cover crops instead of synthetically derived fertilizers to increase productivity, rotate crops, weed mechanically, and reduce dramatically their dependence on the entire family of **pesticides**. Farmers must be certified to characterize crops as organically grown and can only use approved natural and synthetic **biochemicals**, agents, and materials for three consecutive years prior to harvest. Livestock must be fed a diet that includes grains and forages that have been organically grown and cannot receive hormones, sub-therapeutic antibiotics, or other growth promoters.

Organism - Any living being, whether plant, mammal, bird, insect, reptile, fish, crustacean, aquatic or estuarine animal, or bacterium.

Oxidant - A substance containing oxygen that reacts chemically with other materials to produce new substances. Oxidants are the primary ingredients in **smog**.

Ozone - Three molecule oxygen compound (O3) found in two layers of the earth's atmosphere. One layer of beneficial ozone occurs at seven to 18 miles above the surface and shields the earth from ultraviolet light. Several holes in this protective layer have been documented by scientists. Ozone also concentrates at the surface as a result of reactions between **by-products** of fossil fuel combustion and sunlight, having harmful health effects.

Particulates - Liquid or solid particles such as dust, smoke, mist, or smog found in air **emissions**.

Parts per billion (ppb) - One ppb is comparable to one kernel of corn in a filled, 45-foot silo, 16 feet in diameter.

Parts per million (ppm) - One ppm is comparable to one drop of gasoline in a tankful of gas (full-size car).

Parts per trillion (ppt) - One ppt is comparable to one drop in a swimming pool covering the area of a football field 43 ft. deep.

Pathogen - A bacterial **organism** typically found in the intestinal tracts of mammals, capable of producing disease.

Performance Bond - Cash or securities, deposited before a **landfill** operating **permit** is issued, which are held to ensure that all requirements for operating a landfill are performed. The money is returned to the owner after proper closure of the landfill is complete. If contamination or other problems appear at any time during operation, or upon **closure**, and are not addressed, the owner must forfeit

all or part of the performance bond which is then used to cover costs of cleanup.

Permeability - The ease with which water, or other fluid, passes through a substance.

Permissible Exposure Limit (PEL) - Workplace **exposure** limits for contaminants established by **OSHA**.

Permit - A legal document issued by state and/or federal authorities containing a detailed description of the proposed activity and operating procedures as well as appropriate requirements and regulations. The permitting process includes provisions for public comment.

Pesticide - Substances intended to repel, kill, or control any species designated a "pest" including weeds, insects, rodents, fungi, bacteria, or other organisms. The family of pesticides includes **herbicides**, **insecticides**, **rodenticides**, **fungicides**, and **bactericides**.

pH - The measure of acidity or **alkalinity** of a chemical solution, from 0–14. Anything neutral, for example, has a pH of 7. **Acids** have a pH less than 7, bases (alkaline) greater than 7.

Plume - A **concentration** of contaminants in air, soil, or water usually extending from a distinct source.

Point Source - A stationary location or fixed facility such as an industry or municipality that **discharges** pollutants into air or **surface water** through pipes, ditches, **lagoons**, wells, or stacks; a single identifiable source such as a ship or a mine.

Pollution - Any substances in water, soil, or air that degrade the natural quality of the environment, offend the senses of sight, taste, or smell, or cause a health hazard. The usefulness of the natural resource is usually impaired by the presence of pollutants and contaminants.

Pollution Prevention - Actively identifying equipment, processes, and activities which generate excessive wastes or use **toxic chemicals** and then making substitutions, alterations, or product improvements. Conserving energy and minimizing wastes are pollution prevention concepts used in manufacturing, **sustainable agriculture**, **recycling**, and clean air/clean water technologies.

Polychlorinated Biphenyls (PCBs) - A group of toxic, persistent chemicals used in electrical transformers and capacitors for insulating purposes, and in gas pipeline systems as a lubricant. The sale and new use of **PCBs** were banned by law in 1979.

Potable Water - Raw or treated water that is considered safe to drink.

Potentially Responsible Party (PRP) - Any individual or company that is potentially responsible for or has contributed to a spill or other contamination at a **Superfund** site. Whenever possible, **EPA** requires PRPs to clean up sites they have contaminated.

Pretreatment - Methods used by industry and other non-household sources of wastewater to remove, reduce, or alter the pollutants in wastewater before **discharge** to a **POTW**.

Primary Treatment - First stage of wastewater treatment in which solids are removed by screening and settling.

Process Wastewater - Any water which comes into contact with any raw material, product, **by-product**, or waste.

Public Comment Period - The time allowed for the members of an affected community to express views and concerns regarding an action proposed to be taken by EPA, such as a rulemaking, permit, or **Superfund** remedy selection.

Public Water System - Any water system that regularly supplies piped water to the public for consumption, serving at least an average of 25 individuals per day for at least 60 days per year, or has at least 15 service connections.

Publicly Owned Treatment Works (POTW) A municipal or public service district sewage treatment system.

Quality Assurance/Quality Control - A system of procedures, checks, audits, and corrective actions to ensure that all technical, operational, monitoring, and reporting activities are of the highest achievable quality.

Quench Tank - A water-filled tank used to cool incinerator residue or hot materials from industrial processes.

Radioactive Waste - Any waste that emits energy as rays, waves, or streams of energetic particles. Radioactive materials are often mixed with **hazardous waste**, usually from nuclear reactors, research institutions, or hospitals.

Radon - A colorless, naturally occurring gas formed by radioactive decay of radium atoms. Radon accumulating in basements and other areas of buildings without proper ventilation has been identified as a leading cause of lung cancer.

Raw Water - Intake water prior to any treatment or use.

Reactivity - Refers to those **hazardous wastes** that are normally unstable and readily undergo violent chemical change but do not explode.

Receiving Waters - A river, lake, ocean, stream, or other body of water into which wastewater or treated **effluent** is **discharged**.

Recharge Area - An area of land where there is a net annual transfer of water from the surface to **ground water**; where rainwater soaks through the earth to reach an aquifer.

Recycling - Reusing materials and objects in original or changed forms rather than discarding them as wastes.

Record of Decision (ROD) - A public document that explains which cleanup alternative was selected for a **Superfund** site.

Red Bag Waste - see definition for **Medical Waste**.

Reference Dose (RfD) - The particular concentration of a chemical that is known to cause health problems. A standard that also may be referred to as the acceptable daily intake.

Refine - To remove impurities.

Regional Response Team (RRT) - There are 13 RRTs, one for each of 10 federal regions, plus one for Alaska, one for the Caribbean, and one for the Pacific Basin. Each RRT maintains a Regional Contingency Plan and has state and federal government representation. EPA and the U.S. Coast Guard cochair the RRTs. Like the **NRT**, RRTs are planning, policy, and coordinating bodies and do not respond directly to pollution incidents but do provide assistance when requested by the federal **On-Scene Coordinator**. RRTs also provide assistance to **SERCs** and **LEPCs** in local preparedness, planning, and training for emergency response.

Registration - Formal listing with EPA of a new **pesticide** before sale or distribution. EPA is responsible for pre-market licensing of pesticides on the basis of data demonstrating no unreasonable adverse health or environmental effects when applied according to approved label directions.

Release - Any spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping, or disposing into the environment of a **hazardous** or **toxic chemical**, or **extremely hazardous substance**.

Remedial Action - The actual construction or clean-up phase of a **Superfund** site cleanup.

Reportable Quantity (RQ) - Amount of a hazardous or **extremely hazardous substance** that, if released into the environment, must be reported to the **NRC**, the **SERC**, and the **LEPC** under Section 304 of **EPCRA**.

Residual Risk - The risk associated with pollutants after the application of maximum achievable control technology or **MACT**.

Resource Recovery - The extraction of useful materials or energy from solid waste. Such materials can include paper, glass, and metals that can be reprocessed for re-use. Resource recovery also is employed in **pollution prevention**.

Responsiveness Summary - A summary of oral and written comments received by EPA during a **public comment period** on key documents or actions proposed to be taken, and EPA's response to those comments.

Risk - A measure of the chance that damage to life, health, property, or the environment will occur.

Risk Assessment - A process to determine the increased **risk** from exposure to environmental pollutants together with an estimate of the severity of impact. Risk assessments use specific chemical information plus risk factors.

Risk Communication - The process of exchanging information about levels or significance of health or environmental **risk**.

Risk Factor - A characteristic (e.g., race, sex, age, obesity) or variable (e.g., smoking, **exposure**) associated with increased chance of toxic effects. Some standard risk factors used in general **risk assessment** calculations include average breathing rates, average weight, and average human life span.

Rodenticide - A **pesticide** or other agent used to kill rats and other rodents or to prevent them from damaging food, crops, or forage.

Sanitary Water - Water discharged from restrooms, showers, food preparation facilities, or other nonindustrial operations; also known as "gray water."

Scientific Support Coordinators (SSC) - Scientific and technical advisors in coastal and marine areas from the National Oceanic and Atmospheric Administration (NOAA) who serve as members of the federal **On-Scene Coordinator**'s staff. Their capabilities include contingency planning, surface/subsurface trajectory forecasting and hindcasting, resource risk analysis, and liaison to other scientists.

Scrubbing - A common method of reducing stack air emissions; removal of impurities by spraying a liquid that concentrates the impurities into waste.

Secondary Treatment - The second step taken by a **Publicly Owned Treatment Works** in which bacteria consume the organic parts of the waste. This treatment usually removes about 90% of all solids and oxygen-demanding substances.

Sediment - Topsoil, sand, and minerals washed from the land into water, usually after rain or snow melt. Sediments collecting in rivers, reservoirs, and harbors can destroy fish and wildlife habitat and cloud the water so that sunlight cannot reach aquatic plants. Loss of topsoil from farming, mining, or building activities can be prevented through a variety of **erosion**-control techniques.

Septic tank - An underground tank to collect wastes from homes that are not connected to a municipal sewer system. Waste goes from the home to the tank and is decomposed by bacteria. Solids and dead bacteria settle to the bottom as **sludge** while the liquid portion flows into the ground through drains. While properly placed and maintained septic systems can effectively treat domestic wastewater, others are a major source of **ground water** and **surface water pollution**.

Sewer - A channel or conduit that carries wastewater and stormwater to a treatment plant or **receiving waters**. "Sanitary" sewers

carry household, industrial, and commercial waste. "Storm" sewers carry runoff from rain or snow.

Siting - Choosing a location for a facility.

Sludge - The residue (solids and some water) produced as a result of raw or wastewater treatment.

Slurry - A pumpable mixture of solids and fluid.

Small Quantity Generator (SQG) - Persons or facilities that produce 220–2,200 pounds per month of **hazardous waste**. SQGs are required to keep more records than **conditionally exempt generators**. SQGs may include automotive shops, dry cleaners, photographic developers, and a host of other small enterprises. SQGs comprise by far the vast majority of hazardous waste **generators**.

Smog - Dust, smoke, or chemical fumes that pollute the air and make hazy, unhealthy conditions (literally, the word is a blend of smoke and fog). Automobile, truck, bus, and other vehicle exhausts and **particulates** are usually trapped close to the ground, obscuring visibility and contributing to a number of respiratory problems.

Solid Waste - As defined under **RCRA**, any solid, semi-solid, liquid, or contained gaseous materials discarded from industrial, commercial, mining, or agricultural operations, and from community activities. Solid waste includes **garbage**, construction debris, commercial refuse, **sludge** from water supply or waste treatment plants, or air pollution control facilities, and other discarded materials.

Solid Waste Management Facility - Any **disposal** or **resource recovery** system; any system, program, or facility for resource conservation; any facility for the treatment of **solid wastes**.

Source Reduction - The design, manufacture, purchase, or use of materials (such as products and packaging) to reduce the amount or toxicity of **garbage** generated. Source reduction can help reduce waste **disposal** and handling charges because the costs of **recycling**, municipal composting, landfilling, and combustion are avoided. Source reduction conserves resources and reduces **pollution**.

Source Separation - Organizing materials by type (such as paper, metal, plastic, and glass) so that these items can be **recycled** instead of thrown away. For example, many of us separate these items from the rest of our household and office wastes. Industries also organize materials in this fashion.

Standard Industrial Classification Code (SIC Code) - A method of grouping industries with similar products or services and assigning codes to these groups.

State Emergency Response Commission (SERC) - The agency appointed by the Governor to oversee the administration of **EPCRA** at the state level. This commission designates

and appoints members to **LEPCs** and reviews emergency response plans for cities and counties.

Surface Impoundment - Treatment, storage, or disposal of liquid **hazardous wastes** in ponds.

Surface Water - All water naturally open to the atmosphere (rivers, lakes, reservoirs, ponds, **streams, seas,** estuaries) and all springs, wells, or other collectors directly influenced by surface water.

Surfactant - A detergent compound that promotes lathering.

Suspended Solids - Solids that either float on the surface or are suspended in water, wastewater, or other liquids.

Sustainable Agriculture - Environmentally friendly methods of farming that allow the production of crops or livestock without damage to the farm as an **ecosystem**, including effects on soil, water supplies, **biodiversity**, or other surrounding natural resources. The concept of sustainable agriculture is an "intergenerational" one in which we pass on a conserved or improved natural resource base instead of one which has been depleted or polluted. Terms often associated with farms or ranches that are self-sustaining include "low-input," **organic**, "ecological," "biodynamic," and "permaculture."

Synergism - The cooperative action of two or more **organisms** producing a greater total result than the sum of their independent effects; chemicals or muscles in synergy enhance the effectiveness of one another beyond what an individual could have produced.

Technical Assistance Grant (TAG) - EPA grants of up to $50,000 for citizens' groups to obtain assistance in interpreting information related to cleanups at **Superfund** sites. Grants are used by such groups to hire technical advisors to help them understand the site-related information for the duration of response activities.

Ten-to-the-Minus-Sixth (10^{-6}) - Used in **risk assessments** to refer to the probability of **risk**. Literally means a chance of one in a million. Similarly, ten-to-the-minus-fifth means a probability of one in 100,000, and so on.

Teratogen - A substance capable of causing birth defects.

Tertiary Treatment - An enhancement of normal sewage treatment operations to provide water of **potable** quality using further chemical and physical treatment; the highest drinking water standard achieved in the U.S.

Threshold Limit Value (TLV) - The **concentration** of an airborne substance that a healthy person can be exposed to for a 40-hour work week without adverse effect; a workplace **exposure** standard.

Tolerance - Permissible residue level for **pesticides** in raw agricultural produce and processed foods. Whenever a pesticide is regis-

tered for use on a food or feed crop, a tolerance must be established. EPA establishes the tolerance levels, which are enforced by the Food and Drug Administration and the Department of Agriculture.

Tonnage - The amount of waste that a **landfill** accepts, usually expressed as tons per month. The rate at which a landfill accepts waste is limited by the landfill's **permit**.

Total dissolved solids (TDS) - The quantity of dissolved material in a given volume of water.

Toxic Chemical - Substances that can cause severe illness, poisoning, birth defects, disease, or death when ingested, inhaled, or absorbed by living **organisms**.

Toxic Cloud - An airborne mass of gases, **vapors**, fumes, or aerosols of toxic materials.

Toxic Release Inventory (TRI) - A database of annual toxic releases from certain manufacturers compiled from **EPCRA** Section 313 reports. Manufacturers must report annually to EPA and the states the amounts of almost 350 **toxic chemicals** and 22 chemical categories that they release directly to air, water, or land, inject underground, or transfer to off-site facilities. EPA compiles these reports and makes the information available to the public under the "Community Right-to-Know" portion of the law.

Toxic Substance - A chemical or mixture that can cause illness, death, disease, or birth defects. The quantities and **exposures** necessary to cause these effects can vary widely. Many toxic substances are pollutants and contaminants in the environment.

Toxicity Characteristic Leaching Procedure (TCLP) - A test designed to determine whether a waste is hazardous or requires treatment to become less hazardous; also can be used to monitor treatment techniques for effectiveness.

Toxicity Testing - Biological testing (usually with an invertebrate, fish, or small mammal) to determine the adverse effects, if any, of a chemical, compound, or **effluent**.

Trade Secret - Any confidential formula, pattern, process, device, information, or set of data that is used in a business to give the owner a competitive advantage. Such information may be excluded from public review.

Treatment, Storage, and Disposal Facility (TSD) - Refers to any facility which treats, stores, or disposes of **hazardous wastes**.

Ultraviolet Rays - Radiation from the sun in the invisible portion of the spectrum. Some UV rays (UV-A) enhance plant life and are useful in certain medical and dental procedures. Other UV rays (UV-B) can cause skin cancer or other tissue damage. The **ozone** layer in the atmosphere partly shields us from ultraviolet rays reaching the earth's surface.

Underground Injection Control (UIC) - A program under the Safe Drinking Water Act that regulates the use of wells to pump fluids underground.

Underground Storage Tank (UST) - A tank and any underground piping connected to the tank that has 10% or more of its volume (including pipe volume) beneath the surface of the ground. USTs are designed to hold gasoline, other petroleum products, and hazardous materials.

Vapor - The gas given off by substances that are solids or liquids at ordinary atmospheric pressure and temperatures.

Vapor Dispersion - The movement of **vapor** clouds or **plumes** in the air due to wind, gravity, spreading, and mixing.

Vapor Recovery System - A system by which the **volatile** gases from gasoline are captured instead of being released into the atmosphere. Recovery systems may be required for gasoline stations in some cities and other **non-attainment** areas.

Vent - The connection and piping through which gases enter and exit a piece of equipment.

Volatile - Any substance which evaporates quickly.

Volatile Organic Compounds (VOC) - Any organic compound which evaporates readily to the atmosphere. **VOCs** contribute significantly to photochemical **smog** production and certain health problems.

Wasteload Allocation (WLA) - The portion of a stream's total **assimilative capacity** assigned to an individual discharger.

Wastewater Treatment Plant - A facility containing a series of tanks, screens, filters, and other processes by which pollutants are removed from water. Most treatments include **chlorination** to attain safe drinking water standards.

Water Quality Standard (WQS) - The combination of a designated use and the maximum concentration of a pollutant which will protect that use for any given body of water. For example, in a trout stream, the concentration of iron should not exceed 1 mg/l.

Water Table - The boundary between the saturated and unsaturated zones. Generally, the level to which water will rise in a well (except artesian wells).

Wellhead Protection Area - A protected surface and subsurface zone surrounding a well or well field that supplies a public water system and through which contaminants could likely reach well water.

Wetlands - Areas that are soaked or flooded by **surface** or **ground water** frequently enough or for sufficient duration to support plants, birds, animals, and aquatic life. Wet-

lands generally include swamps, marshes, bogs, estuaries, and other inland and coastal areas, and are federally protected. Wetlands frequently serve as **recharge/discharge** areas and are known as "nature's kidneys" since they help purify water. Wetlands also have been referred to as natural sponges that absorb flood waters, functioning like natural tubs to collect overflow. Wetlands are important wildlife habitats, breeding grounds, and nurseries because of their **biodiversity**. Many **endangered species** as well as countless estuarine and marine fish and shellfish, mammals, waterfowl, and other migratory birds use wetland habitat for growth, reproduction, food, and shelter. Wetlands are among the most fertile, natural **ecosystems** in the world since they produce great volumes of food (plant material).

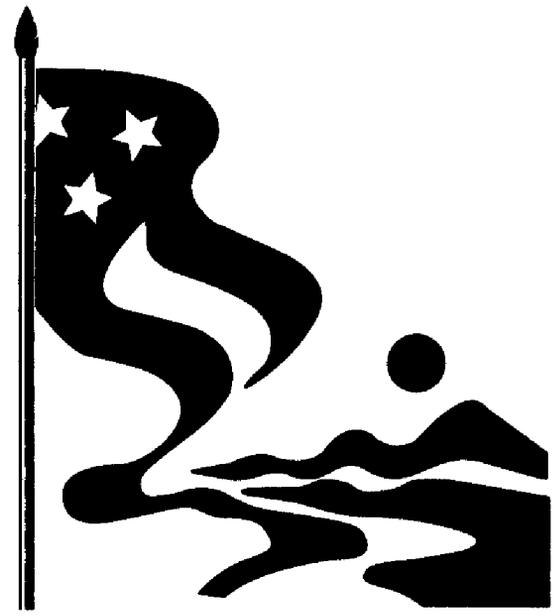
Wildlife Refuge - An area designated for the protection of wild animals, within which hunting and fishing are either prohibited or strictly controlled.

Wood Treatment Facility - An industrial facility which treats lumber and other wood products for outdoor use. The process involves use of chromated copper arsenate and other **toxic chemicals** which are regulated as hazardous materials.

Xenobiotic - A term for non-natural or man-made substances found in the environment (i.e., synthetics, plastics).

Z-list - **OSHA's** Toxic and Hazardous Substances Tables (Z-1, Z-2, and Z-3) of air contaminants; any material found on these tables is considered hazardous.

Zone of Saturation - The layer beneath the surface of the land in which all openings are filled with water.



major environmental laws

If you are interested in becoming active in environmental, health, and community safety issues, you will need to understand many of the following federal laws. These laws, and others enacted by states, have various requirements and are enforced by various agencies. We have presented a brief description of the intent of each law. For more details, you should obtain a copy from your local library, state library, or the relevant federal or state agency. Federal and state officials, community organizations, and interest groups will help you gain a working knowledge of these laws.

the clean air act (CAA)

42 U.S.C. s/s 7401 et seq. (1970)

The Clean Air Act is the comprehensive federal law which regulates air **emissions** from area, stationary, and mobile sources. This law authorizes the U.S. Environmental Protection Agency (EPA) to establish National Ambient Air Quality Standards **(NAAQS)** to protect public health and the environment. The goal of the Act was to set and achieve NAAQS in every state by 1975. This setting of maximum pollutant standards was coupled with directing the states to develop state implementation plans (SIPs) applicable to appropriate industrial sources in the state.

The Act was amended in 1977 primarily to set new goals (dates) for achieving attainment of NAAQS since many areas of the country had failed to meet the deadlines. The 1990 amendments to the Clean Air Act in large part were intended to meet unaddressed or insufficiently addressed problems such as **acid rain**, ground level **ozone**, stratospheric **ozone** depletion, and air toxics.

the clean water act (CWA)

33 U.S.C. s/s 121 et seq. (1977)

The **Clean Water Act** is a 1977 amendment to the Federal Water Pollution Control Act of 1972, which set the basic structure for regulating **discharges** of pollutants to waters of the United States. This law gave **EPA** the authority to set **effluent** standards on an industry-by-industry basis (technology-based) and continued the requirements to set **water quality standards** for all contaminants in surface waters. The CWA makes it unlawful for any person to **discharge** any pollutant from a **point source** into navigable waters unless a **permit (NPDES)** is obtained under the Act. The 1977 amendments focused on toxic pollutants. In 1987, the CWA was reauthorized and again focused on **toxic substances**, authorized citizen suit provisions, and funded sewage treatment plants **(POTWs)** under the Construction Grants Program.

The **CWA** provides for the delegation by **EPA** of many permitting, administrative, and enforcement aspects of the law to state governments. In states with the authority to implement CWA programs, EPA still retains oversight responsibilities.

the comprehensive environmental response, compensation, and liability act (CERCLA or Superfund)

42 U.S.C. s/s 9601 et seq. (1980)

CERCLA (pronounced SERK-la) provides a federal "Superfund" to clean up uncontrolled or abandoned **hazardous waste** sites as well as accidents, spills, and other emergency releases of pollutants and contaminants into the environment. Through the Act, EPA was given power to seek out those parties responsible for any release and assure their cooperation in the cleanup. EPA cleans up orphan sites when **potentially responsible parties (PRPs)** cannot be identified or located, or when they fail to act. Through various enforcement tools, EPA obtains private party cleanup through orders, **consent decrees**, and other small party settlements. EPA also recovers costs from financially viable individuals and companies once a response action has been completed.

EPA is authorized to implement the Act in all 50 states and U.S. territories. **Superfund** site identification, monitoring, and response activities in states are coordinated through the state environmental protection or waste management agencies.

the emergency planning & community right-to-know act (EPCRA)

42 U.S.C. 11011 et seq. (1986)

Also known as Title III of **SARA**, EPCRA was enacted by Congress as the national legislation on community safety. This law was designed to help local communities protect public health, safety, and the environment from chemical hazards.

To implement EPCRA, Congress required each state to appoint a State Emergency Response Commission **(SERC)**. The SERCs were required to divide their states into Emergency Planning Districts and to name a Local Emergency Planning Committee **(LEPC)** for each district. Broad representation by fire fighters, health officials, government and media representatives, community groups, industrial facilities, and emergency managers ensures that all necessary elements of the planning process are represented.

the endangered species act

7 U.S.C. 136; 16 U.S.C. 460 et seq. (1973)

The Endangered Species Act provides a program for the conservation of threatened and endangered plants and animals and the habitats in which they are found. The U.S. Fish and Wildlife Service (FWS) of the Department of Interior maintains the list of 632 endangered species (326 are plants) and 190 threatened species (78 are plants). Species include birds, insects, fish, reptiles, mammals, crustaceans, flowers, grasses, and trees. Anyone can petition FWS to include a species on this list or to prevent some activity, such as logging, mining, or dam building. The law prohibits any action, administrative or real, that results in a "taking" of a listed species, or adversely affects habitat. Likewise, import, export, interstate, and foreign commerce of listed species are all prohibited.

EPA's decision to register a **pesticide** is based in part on the **risk** of adverse effects on endangered species as well as environmental fate (how a pesticide will effect habitat). Under **FIFRA**, EPA can issue emergency suspensions of certain pesticides to cancel or restrict their use if an endangered species will be adversely affected. Under a new program, EPA, FWS, and USDA are distributing hundreds of county bulletins which include habitat maps, pesticide use limitations, and other actions required to protect listed species.

In addition, we are enforcing regulations under various treaties, including the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). The U.S. and 70 other nations have established procedures to regulate the import and export of imperiled species and their habitat. The Fish and Wildlife Service works with U.S. Customs agents to stop the illegal trade of species, including the Black Rhino, African elephants, tropical birds and fish, orchids, and various corals.

the federal insecticide, fungicide and rodenticide act (FIFRA)

7 U.S.C. s/s 135 et seq. (1972)

The primary focus of FIFRA was to provide federal control of **pesticide** distribution, sale, and use. EPA was given authority under FIFRA not only to study the consequences of

pesticide usage but also to require users (farmers, utility companies, and others) to register when purchasing pesticides. Through later amendments to the law, users also must take exams for certification as applicators of pesticides. All pesticides used in the U.S. must be registered (licensed) by EPA. Registration assures that pesticides will be properly labeled and that, if used in accordance with specifications, will not cause unreasonable harm to the environment.

the (federal) freedom of information act (FOIA)

U.S.C. s/s 552 (1966)

The Freedom of Information Act provides specifically that "any person" can make requests for government information. Citizens who make requests are not required to identify themselves or explain why they want the information they have requested. The position of Congress in passing FOIA was that the workings of government are "for and by the people" and that the benefits of government information should be made available to everyone.

All branches of the federal government must adhere to the provisions of FOIA with certain restrictions for work in progress (early drafts), enforcement confidential information, classified documents, and national security information.

the national environmental policy act (NEPA)

42 U.S.C. s/s 4321 et seq. (1969)

The National Environmental Policy Act was one of the first laws ever written that establishes the broad national framework for protecting our environment. NEPA's basic policy is to assure that all branches of government give proper consideration to the environment prior to undertaking any major federal action which significantly affects the environment. NEPA requirements are invoked when airports, buildings, military complexes, highways, parkland purchases, and other such federal activities are proposed. **Environmental Assessments (EAs)** and **Environmental Impact Statements (EISs)**, which are assessments of the likelihood of impacts from alternative courses of action, are required from all federal agencies and are the most visible NEPA requirements.

the occupational safety and health act

29 U.S.C. 61 et seq. (1970)

Congress passed the Occupational and Safety Health Act to ensure worker and workplace safety. Their goal was to make sure employers provide their workers a place of employment free from recognized hazards to safety and health, such as exposure to **toxic chemicals**, excessive noise levels, mechanical dangers, heat

or cold stress, or unsanitary conditions. In order to establish standards for workplace health and safety, the Act also created the National Institute for Occupational Safety and Health (**NIOSH**) as the research institution for the Occupational Safety and Health Administration (**OSHA**). OSHA is a division of the U.S. Department of Labor which oversees the administration of the Act and enforces federal standards in all 50 states.

the oil pollution act of 1990

33 U.S.C. Section 2702 to 2761

The Oil Pollution Act (OPA) of 1990 streamlined and strengthened EPA's ability to prevent and respond to catastrophic oil spills. A trust fund financed by a tax on oil is available to clean up spills when the responsible party is incapable or unwilling to do so. The OPA requires oil storage facilities and vessels to submit to the federal government response plans detailing how they will respond to large discharges. EPA has published regulations for aboveground storage facilities; the Coast Guard has done so for oil tankers. The OPA also requires the development of Area Contingency Plans to prepare and plan for oil spill response on a regional scale.

the pollution prevention act

42 U.S.C. 13101 and 13102, s/s 6602 et seq. (1990)

The Pollution Prevention Act focused industry, government, and public attention on reducing the amount of pollution produced through cost-effective changes in production, operation, and raw materials use. Opportunities for source reduction are often not realized because existing regulations, and the industrial resources required for compliance, focus on treatment and disposal. Source reduction is fundamentally different and more desirable than waste management or pollution control. Pollution prevention also includes other practices that increase efficiency in the use of energy, water, or other natural resources, and protect our resource base through conservation. Practices include **recycling**, **source reduction**, and **sustainable agriculture**.

the resource conservation and recovery act (RCRA)

42 U.S.C. s/s 321 et seq. (1976)

RCRA (pronounced "rick-rah") gave EPA the authority to control hazardous waste from "cradle-to-grave." This includes the generation, transportation, treatment, storage, and disposal of hazardous waste. RCRA also set forth a framework for the management of non-hazardous solid wastes.

The 1986 amendments to RCRA enabled EPA to address environmental problems that could result from underground tanks storing petroleum and other hazardous substances. RCRA focuses only on active and future facilities and does not address abandoned or historical sites (see **CERCLA**).

HSWA (pronounced "hiss-wa") - The federal Hazardous and Solid Waste Amendments. The 1984 amendments to **RCRA** which required phasing out land **disposal** of **hazardous waste**. Some of the other mandates of this strict law include increased enforcement authority for **EPA**, more stringent hazardous waste management standards, and a comprehensive **underground storage tank** program.

the safe drinking water act (SDWA)

43 U.S.C. s/s 300f et seq. (1974)

The Safe Drinking Water Act was established to protect the quality of drinking water in the U.S. This law focuses on all waters actually or potentially designated for drinking use, whether from above ground or underground sources. The Act authorized EPA to establish safe standards of purity and required all owners or operators of public water systems to comply with primary (health-related) standards. State governments, which assume this power from EPA, also encourage attainment of secondary standards (nuisance-related).

the superfund amendments and reauthorization act (SARA)

42 U.S.C. 9601 et seq. (1986)

The Superfund Amendments and Reauthorization Act of 1986 reauthorized **CERCLA** to continue cleanup activities around the country. Several site-specific amendments, definitions, clarifications, and technical requirements were added to the legislation, including additional enforcement authorities.

Title III of **SARA** also authorized the Emergency Planning and Community Right-to-Know Act (**EPCRA**).

the toxic substances control act (TSCA)

15 U.S.C. s/s 2601 et seq. (1976)

The Toxic Substances Control Act of 1976 was enacted by Congress to test, regulate, and screen all chemicals produced or imported into the U.S. Many thousands of chemicals and their compounds are developed each year with unknown toxic or dangerous characteristics. To prevent tragic consequences, TSCA requires that any chemical that reaches the consumer market place be tested for possible toxic effects prior to commercial manufacture.

Any existing chemical that poses health and environmental hazards is tracked and reported under TSCA. Procedures also are authorized for corrective action under TSCA in cases of cleanup of toxic materials contamination. TSCA supplements other federal statutes, including the **Clean Air Act** and the **Toxic Release Inventory** under **EPCRA**.

government agencies

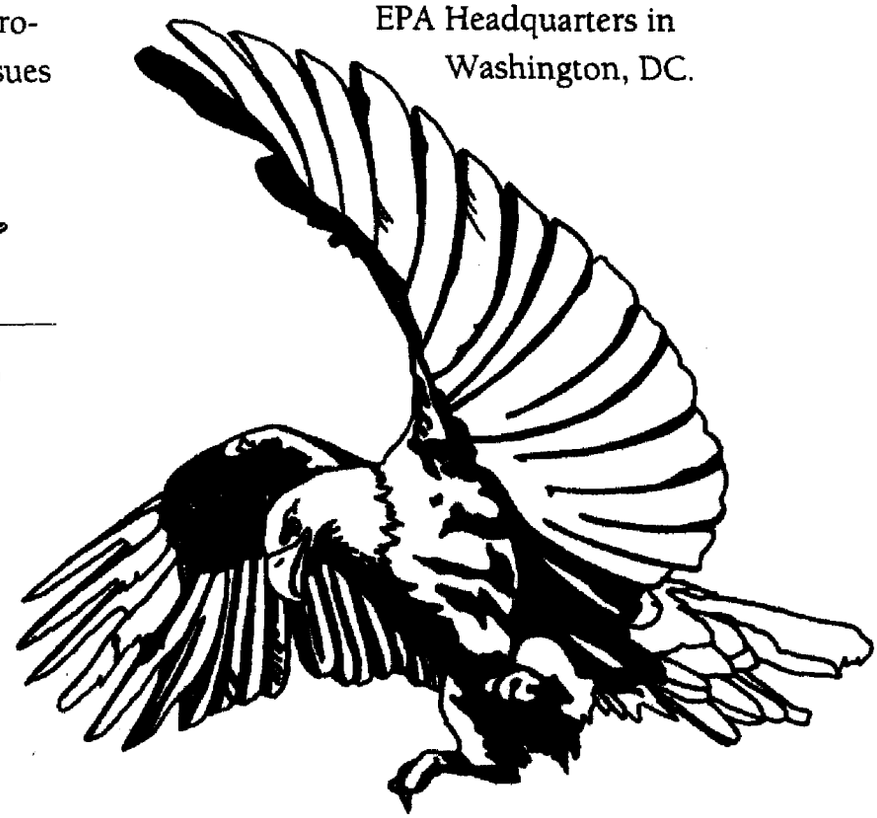
Throughout this handbook we have referred to organizations, agencies, and offices to contact for further information. The following is a list of several of those organizations and agencies dealing with health and environmental protection. For each citation, a current address and phone number are provided, as well as a brief notation of responsibilities and/or interests of the group. This list is provided for quick reference when specific issues arise but is by no means complete.

federal agencies for health & environmental protection

U.S. Environmental Protection Agency (EPA)
401 M Street, S.W.
Washington, DC 20460
(202) 260-2080

Public Information Center, open 9 AM to 4:30 PM, Monday – Friday

Responsible for: working with state and local governments to control and prevent pollution in areas of solid and hazardous waste, pesticides, water, air, drinking water, and toxic and radioactive substances. When contacting EPA, we suggest starting with your Regional Office. If the Regional Office is unable to assist you, your questions may be directed to EPA Headquarters in Washington, DC.



U.S. EPA regional offices

Region 1

U.S. EPA (Connecticut, Massachusetts, Maine, New Hampshire, Rhode Island, Vermont)

JFK Federal Building
1 Congress Street
Boston, MA 02203
617/565-3420

Region 2

U.S. EPA (New Jersey, New York, Puerto Rico, Virgin Islands)

26 Federal Plaza
New York, NY 10278
212/264-2657

Region 3

U.S. EPA (Delaware, Maryland, Pennsylvania, Virginia, West Virginia, District of Columbia)

841 Chestnut Building
Philadelphia, PA 19107
215/597-2176

Region 4

U.S. EPA (Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, Tennessee)

345 Courtland Street, NE
Atlanta, GA 30365
404/347-3004

Region 5

U.S. EPA (Illinois, Indiana, Michigan, Minnesota, Ohio, Wisconsin)

77 West Jackson
Chicago, IL 60604
312/353-2000

Region 6

U.S. EPA (Arkansas, Louisiana, New Mexico, Oklahoma, Texas)

1445 Ross Avenue
Dallas, TX 75202
214/655-6444

Region 7

U.S. EPA (Iowa, Kansas, Missouri, Nebraska)

726 Minnesota Avenue
Kansas City, KS 66401
913/551-7000

Region 8

U.S. EPA (Colorado, Montana, North Dakota, South Dakota, Utah, Wyoming)

999 18th Street
Denver, CO 80202-2466
303/293-1603

Region 9

U.S. EPA (Arizona, California, Hawaii, Nevada, Guam, American Samoa)

75 Hawthorne Street
San Francisco, CA 94105
415/744-1305

Region 10

U.S. EPA (Idaho, Washington, Oregon, Alaska)

1200 Sixth Avenue
Seattle, WA 98101
206/553-1200

U.S. department of justice (DOJ)

10th and Constitution Ave., N.W.
Washington, D.C. 20530
202/514-2007

Responsible for: all enforcement actions that must be filed in court, and organizing evidentiary and other documents to prepare for and conduct litigation. Litigation includes the protection, use, and development of the nation's natural resources and public lands, wildlife protection, Indian rights and claims, cleanup of hazardous waste sites, acquisition of private property for federal use, and defense of environmental challenges to government programs and activities. DOJ's Environment and Natural Resources Division is the nation's environmental lawyer and the largest environmental law firm in the country.

U.S. department of transportation (DOT)

400 7th Street, S.W.
Washington, D.C. 20590
202/366-4570

Responsible for: setting standards for safety and providing funds to plan, construct and operate transportation systems by rail, highway, air, or water and providing law enforcement and traffic management services for the nation's airspace and waterways. DOT also regulates manufacturers of containers and transporters of hazardous materials.

U.S. coast guard

2100 2nd St., S.W.
Washington, D.C. 20593
202/267-1587

Responsible for: port safety, maritime law enforcement, boating safety, search and rescue, aids to navigation, merchant marine safety, and environmental protection. The Coast Guards works with EPA on marine protection programs, including regulating the transportation of hazardous cargoes, oil pollution cleanup, and marine salvage.

federal emergency management agency (FEMA)

P.O. Box 70274
Washington, D.C. 20024
202/646-4600

Responsible for: providing a federal focus on emergency management in the United States. This includes natural disasters such as earthquakes, hurricanes, tornadoes, and floods, technological calamities, and national security crises.

U.S. geological survey (USGS)

12201 Sunrise Valley Drive
Mail Stop 119
Reston, VA 22092
703/648-4460

Responsible for: analyzing the quantity and quality of surface and ground water and pre-

cipitation, and conducting research in geology and hydrology. Programs include extensive topographic and land-use mapping, energy and mineral resource assessments, evaluations of natural disasters, and space exploration.

U.S. department of health & human services:

National Institute for Occupational Safety and Health (NIOSH)

1600 Clifton Road, N.E.,
Building 1, Room 3007
Atlanta, GA 30333
1-800/356-4674

Centers for Disease Control and Prevention (CDC)

1600 Clifton Road, N.E., Building 1
Atlanta, GA 30333
404/639-2888

Agency for Toxic Substances and Disease Registry (ATSDR)

1600 Clifton Road, N.E., Building 1
Atlanta, GA 30333
404/639-2888

NIOSH provides research and evaluation studies of occupational injuries and hazardous substances in the workplace. These criteria are used by **OSHA** for setting workplace safety standards. The **CDC** tracks and evaluates incidence of disease and performs epidemiological studies. **ATSDR** conducts research focused on toxic substances and their effects on public health. Programs include health studies, substance-specific research, and maintaining various disease registries.

U.S. department of labor

Occupational Safety and Health Administration (OSHA)

200 Constitution Ave., N.W.
Washington, D.C. 20210
202/219-8151

Responsible for: issuing standards and rules for safe and healthful working conditions, tools, equipment, facilities, and processes. Employers have the general duty of providing their workers a place of employment free from recognized hazards to safety and health, and must comply with OSHA standards. OSHA conducts workplace inspections to assure standards are followed.

National Oceanic and Atmospheric Administration (NOAA)

14th and Constitution Ave., N.W., Rm 6013
Washington, D.C. 20230
202/482-6090

Responsible for: environmental satellite and data information, oceanic and atmospheric research, sustainable development, coastal management programs, cleanup of oil spills, the National Weather Service, and the National Marine Fisheries Service.

EPA information numbers

In many situations, a phone call to EPA can provide you with the information you need to start working with environmental issues. Below is a list of some of the most useful EPA telephone numbers. Although numbers change periodically, these were correct at the time of printing. All telephone numbers are in the Eastern Standard Time Zone.

general U.S.EPA numbers

Public Information Center
(202) 260-2080
(202) 260-7751

ORD Research Information (Cincinnati)
(513) 569-7562

National Center for Environmental Publications & Information (Cincinnati)
(513) 489-8190

hotlines listed by topic

Acid Rain
(617) 674-7377

Air Control Technology Assistance Center
(919) 541-0800

Air Risk Hotline
(919) 541-0888

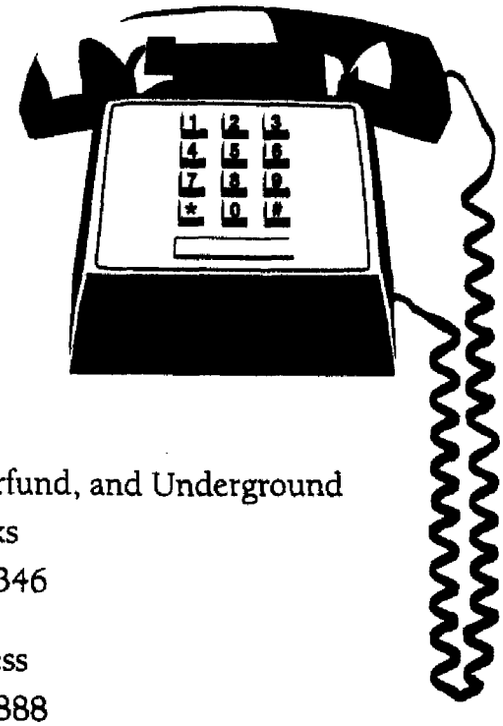
Appropriate Technology (energy: DOE)
(800) 428-2525

Asbestos Ombudsman
(800) 368-5888

Drinking Water
(800) 426-4791

Emergency Planning & Community Right-to-Know
(800) 535-0202

Environmental Education
(202) 260-4962



Environmental Justice
(800) 962-6215

Green Lights/Energy Star Programs
(202) 775-6650

Ground Water
(202) 260-7786

Hazardous Waste Ombudsman
(800) 262-7937

Indoor Air
(800) 438-4318

National Response Center (U.S. Coast Guard)
(800) 424-8802

Pesticides (health effects, spills)
(800) 858-7378

Pollution Prevention Info. Exchange System
(703) 821-4800

Pollution Prevention Clearinghouse
(202) 260-1023

Radon
(800) 767-7236

RCRA, Superfund, and Underground Storage Tanks
(800) 424-9346

Small Business
(800) 366-5888

Solid Waste Information Clearinghouse
(800) 677-9424

Storm Water, NPDES Permitting
(703) 821-4823

Stratospheric Ozone Protection (CFCs)
(800) 296-1996

Toxic Substances & Asbestos Information
(202) 554-1404

Transporting Hazardous Materials
(DOT/FEMA)
(800) 752-6367

Waste Water
(800) 624-8301

Wetlands
(800) 832-7828

we want your comments!

Additional copies of this Guide may be obtained from:

U.S. EPA
Public Information Center (3404)
401 M Street, SW
Washington, D.C. 20460
(202) 260-7751

This booklet is intended to help you address environmental issues that interest you. Help us do a better job by letting us know what information you need. Questions or suggestions for future revisions of this Guide can be sent to the Project Manager, mail code (2225), or call (202) 260-9812.