Environment & Health

Learn about the Environment Where You Live

Protect the Health of Your Family and Community

By Patricia Coogan & Terry A. Greene

JSI
CENTER FOR ENVIRONMENTAL HEALTH STUDIES
44 Farnsworth St., Boston, MA 02210-1211 • Tel.: (617) 582-9485 • Website: www.jsirt.org

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INTRODUCTION

The purpose of this tutorial is to help discover whether health in your community is now, or has the potential to be, affected by hazardous chemicals. It introduces sources of available information the public can use to profile the quality of the local environment and the health of local residents. It offers guidance to concerned citizens so that they may better protect themselves, their children, and the environment where they live.

In this Introduction, we will discuss what you can gain from the tutorial. We introduce a case study of a community that is used as an example throughout the tutorial. We also talk about how to get started, including mapping your community.

AT THE END OF THIS TUTORIAL, YOU WILL KNOW:

1. What environmental information is available to investigate the environmental quality of your community
2. What health information is collected, and how it can be used to help answer the question: "Is my community experiencing more illness than it should?"
3. Where and how to get this environmental and health information
4. How to use this information to protect local health and environment

THE WOBURN CASE STUDY

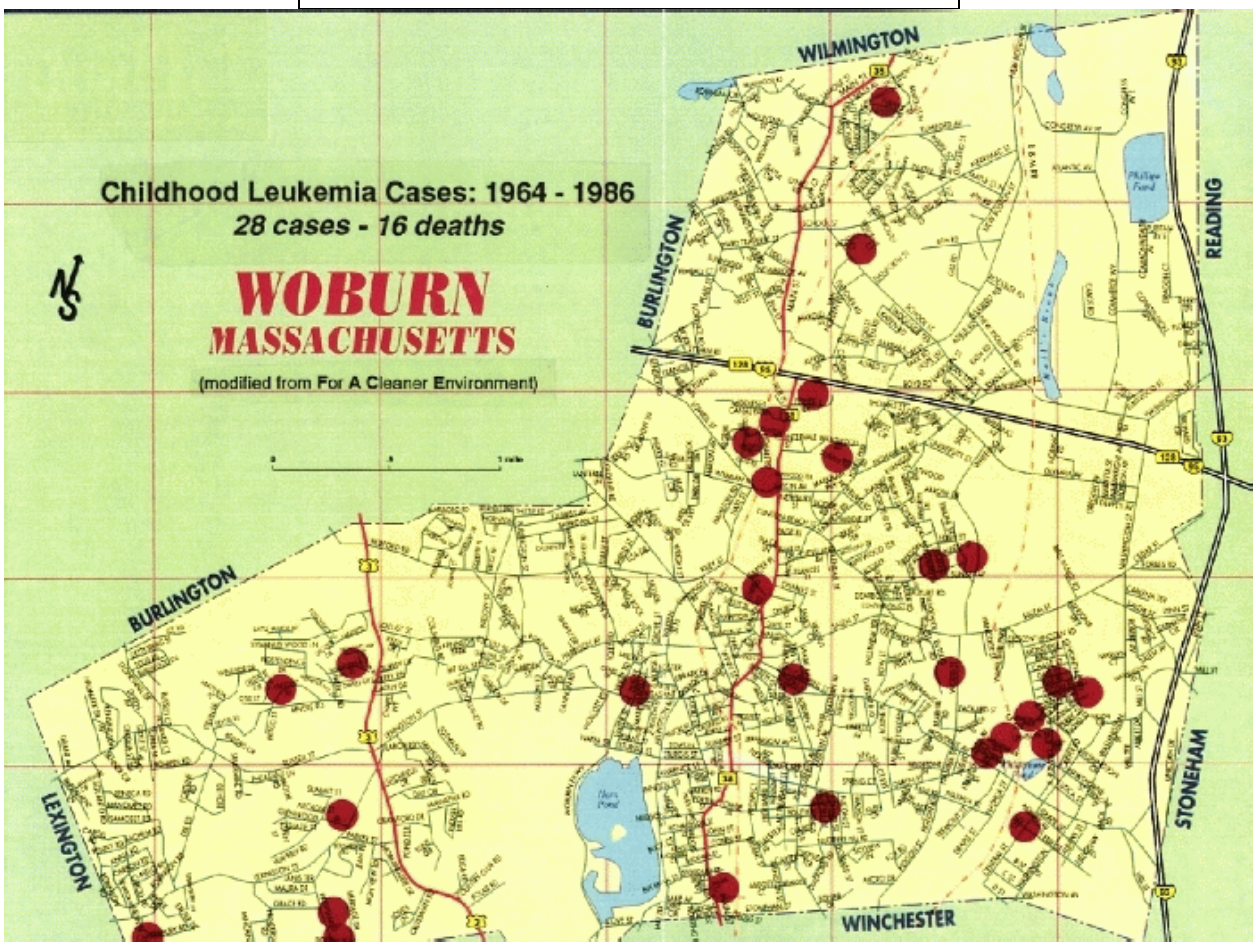
In Woburn, Massachusetts, hazardous chemicals in the water supply are the suspected cause of an outbreak of childhood leukemia. Throughout this tutorial, we will use Woburn as an example to illustrate how to locate and use environmental health information to protect your children and community.

Twelve children were diagnosed with leukemia between 1969 and 1979. The mother of one of these children was the first to notice that too many children in her neighborhood were being diagnosed with leukemia. Later in this tutorial, we will show you how you can investigate a hunch like this, using available health data.

Shortly after the leukemia cluster was discovered, environmental agencies found that chemicals from nearby industrial property had contaminated drinking water in the area. Health studies in Woburn were conducted by Harvard University researchers with the help of citizens, and also by the Massachusetts Department of Public Health. They found that the leukemia was associated with the contaminated drinking water in the city. The following map of Woburn shows where the contaminated water supply, Wells G and H, was located and where the children with leukemia lived.

This map of Woburn shows where the contaminated water supply, Wells G and H, was located and where the children with leukemia lived.

(Adapted from map in the collection of Scott Bair, Ohio State University)



Legend: ● Cases of Childhood Leukemia ◆ Drinking Wells

COMMUNITY HEALTH STUDIES

The efforts of citizens to prompt research and to address this tragic environmental health problem provide important lessons on community environmental health advocacy. In Woburn, researchers were able to connect a specific source of environmental contamination to a specific health problem. This is not possible in most communities. Usually, not enough information is available on what people are actually exposed to. One difficulty, for example, is that people frequently move in and out of the community. Since health problems may take years to develop, affected persons may no longer be in the area, and unexposed newcomers may be present. This is one of the factors that makes a community environmental health study very difficult.

ENVIRONMENTAL HEALTH PROFILES

Often a better option than a health study is to create an environmental health profile of your community. The first step in this profile is to uncover the possible sources of environmental contamination in your community. Next, consider how people might be exposed to these contaminants and what may pose the greatest risk. With this information, you can take action to improve conditions and ensure our children inherit a clean, safe, and healthy environment.

INFORMATION ABOUT YOUR COMMUNITY

Many aspects of our environment can affect our children's and our own health. This tutorial focuses on industrial sources of hazardous chemical pollution in a community. We will discuss many different sources and types of information. You might want to start your effort by collecting just the information that can help address one important question or concern. For example, you could identify a business in your community that releases toxic chemicals into the environment and learn how they could prevent pollution. If you have time, resources, and a team to work together, you may want to try to gather as much information for your community as you can, to create a local environmental health profile.

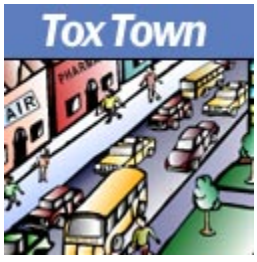
Several excellent resources exist for addressing a range of other important environmental health concerns that this tutorial does not cover, such as:

Our personal use of materials that may be harmful;

- Radon, exhaust from heating systems, allergens and other factors affecting indoor air quality;
- Workplace hazards; and

Broader sources of pollution in the community, such as pesticide use, car exhaust, and lead in water distribution pipes.

You can locate information on these areas by contacting the various agencies, hotlines and other resources listed in the JSI Health & Environment Contact Guide in Appendix A. A wonderful resource covering a wealth of environmental health topics is the National Library of Medicine® website (http://www.nlm.nih.gov). Try out their "ToxTown" online tutorial (http://toxtown.nlm.nih.gov) to learn about a range of community concerns and link to helpful information sources.



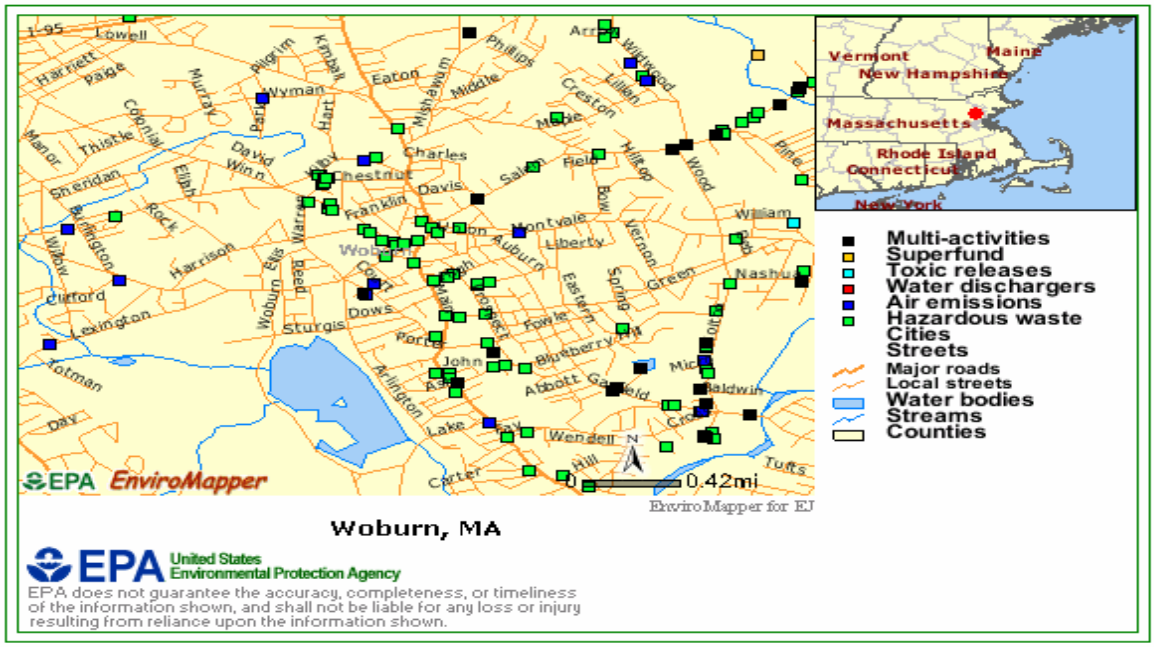
GETTING STARTED: MAPS

Before you start your investigation, it can help to get a good map of your area. Maps help you organize information you gather and help you identify *neighborhoods* at risk and areas *in the community you most want to protect*. Maps may be available through local engineer, planner, or assessor offices.

U.S. Geological Survey maps (http://www.usgs.gov), available online and in bookstores, are helpful for locating:

- Streets
- Schools and hospitals
- Sensitive natural resource areas
- Areas that affect and that are affected by your water supply
- Transportation routes
- Industries

There are now many maps made for use with a computer. Computer mapping systems for your community may be used by your fire department or environmental and health agencies. If you have a computer, free and inexpensive systems allow you to map data about the local environment yourself. The EPA website has many useful maps that display local or regional environmental and health information. From the **EPA homepage** (http://www.epa.gov), select "**Where You Live**" to create a variety of environmental maps of your zip code, county, or state. Another valuable source of environmental maps is **Scorecard** (http://www.scorecard.org) from the nonprofit Environmental Defense. Below is an example from EPA's EnviroMapper:



The map on the previous page shows Woburn, MA. It was made by typing in Woburn's zip code and clicking "Enviromapper" on EPA's Search Your Community website. Boxes on the map show the location of sites where information is available from the federal government about activities that affect the environment. Hazardous waste sites are shown by green boxes. Sites that have a permit to release chemicals to water are shown by red boxes. Locations with permits to release chemicals to the air are marked by dark blue boxes. Some sites have more than one activity that affects the environment. These are marked with a black box. We will discuss what you can learn about these sites and activities in the rest of this tutorial.

In this section, we will discuss sources of information to help answer the question, "What is the environmental quality of my community?"

WHERE TO START

Where can you start to learn about the environmental quality of your community? Information on the environment in your community is contained in many different places. Locating it can be confusing and a bit overwhelming at first. Information on the environment is collected by:

- U.S. Environmental Protection Agency (EPA)
- State and tribal departments of the environment and of public health (the names vary by state or tribe)
- Local boards of health, fire departments, and water companies

Other agencies also collect information (or data), but these are the best places to start.

Agencies responsible for collecting information vary depending on the local, tribal, state, or federal environmental protection law that requires the data to be gathered. For example, the EPA Office of Water has information on water quality collected under the federal Clean Water Act. The EPA Office of Air and Radiation has information on air quality collected under the federal Clean Air Act. State environmental offices may collect their own information on air or water quality. **The Health and Environmental Contacts Resource Guide** in Appendix A of this tutorial lists various agencies and departments and the information they may provide.

Agencies and nonprofits are working to bring much of this information together and to make it more useful to communities. For example, the EPA has gathered environmental data from their different offices and makes it available on the Internet through their **ENVIROFACTS Database** (http://www.epa.gov/enviro/).

We will consider the following general categories of environmental data to prepare a community profile.

1. Hazardous waste sites
2. Active industries permitted to discharge chemicals
3. Air quality
4. Water quality
5. Industrial history

HAZARDOUS WASTE SITES

Let's first identify whether there is land in the community that may be polluted with hazardous waste.

A good place to start learning about hazardous waste sites is to call the state or tribal departments of environmental protection and ask for the Hazardous Waste Division. You could ask for a public information contact person, or you might ask to talk to someone who is familiar with any hazardous waste sites in your community. In some tribes and states, hazardous waste may be handled by the public health department. If you need more help, contact the Environmental Protection Agency in your region and ask for the Community Involvement Coordinators. Once you have found the right person, ask about the following types of hazardous waste sites:

SUPERFUND SITES

First, learn if there are any **Superfund Sites** (also called CERCLA sites) in your area. A Superfund site is an area considered so hazardous that it is eligible for federal money for a cleanup overseen by the EPA.

If there is a Superfund site, ask who the local contact is for the site. Each Superfund site should have a Community Coordinator. They can help you find public fact sheets and research about the site and health concerns. Learn how the public can get involved in decisions about cleaning the site.

In Woburn, there are two Superfund sites. The **Industri-Plex** site is a 245-acre industrial park. From 1853 to 1931, the site was used for manufacturing chemicals such as lead-arsenic insecticides, acetic acid, and sulfuric acid for local textile, leather, and paper manufacturing industries. **Wells G & H** were two municipal wells developed in 1964 and 1967 to supplement the water supply of the City of Woburn. The wells were shut down in 1979 after they were found to be contaminated.

Superfund Resources:

- **EPA Superfund Sites** (http://www.epa.gov/superfund/sites/index.htm) Information on hazardous waste sites under the Superfund program and risks to human health.
- **Superfund Community Involvement Website** (http://www.epa.gov/superfund/action/community/) lists Superfund site community involvement opportunities, resources, and contacts.
- **Superfund/Emergency Planning and Community Right-to-Know Hotline**
  - National toll-free (outside of DC area): (800) 424-9346
  - National toll-free for the hearing impaired (TDD): (800) 553-7672

- **Scorecard** (http://www.scorecard.org)
  Environmental Defense offers a Scorecard with local environmental information for community residents. Scorecard provides maps and information to locate and learn about Superfund sites in U.S. communities. Included are site summaries, lists of chemical contamination and health hazard information. You can also compare communities.

OTHER HAZARDOUS WASTE SITES

Next, you should learn if there are any other hazardous waste sites that are not covered by Superfund.

States and tribes keep additional lists of hazardous waste sites. These lists include everything from leaking underground storage tanks at gas stations to small dumpsites. Ask your state or tribal environmental departments for their listings of waste sites. You have a right to know this information. Some states post their lists of waste sites on the Internet.

A search for sites in Woburn found 42 waste sites and more sites where spills had been reported. Table 1 shows a few of the sites.

Table 1 Waste Sites in Woburn

MA Bureau of Waste Site Cleanup

Tracking Number	Site Name	Address	Status	Phase	Chemical Type
3-0000594	OLYMPIA NOMINEE TRUST	60 OLYMPIA AVE	TIER 1B	PHASE IV	Hazardous Material
3-0004250	MOBIL SERVICE STATION NO 11860	183 CAMBRIDGE ST	TIER 1C	PHASE V	Oil and Hazardous Material
3-0000854	HILLTOP CONSTRUCTION	124 DRAGON CT	TIER 1D		
3-0000171	AMERICAN SHOE MACHINERY	30 NASHUA ST	TIER 2	PHASE II	

Source: http://www.mass.gov/dep/bwsc/sites/report.htm

Ask what information about these sites is available, what the cleanup options are, and how the public can get involved. There may be a location near you, such as the library, which keeps copies of waste site documents for the public and receives notices of public involvement meetings. Below are some additional sources of information on hazardous waste sites.

Additional Information on Hazardous Waste Sites:

Bureau of Land Management:

- **Abandoned Mines** (http://www.blm.gov/aml/)

Office of Surface Mining:

- **Reclaiming Abandoned Mines** (http://www.osmre.gov/osm.htm)

Department of Defense (DoD):

- **DoD Native American Environmental Tracking System** (https://naets.usace.army.mil/web/tribe/tribe.cfm) Listing of waste sites and impacts of DoD activities on American Indian and Alaska Native lands.

Grassroots Citizens Advocacy (see also Appendix A):

Center for Health, Environment, and Justice (http://www.chej.org) Assists community advocates address hazardous waste sites and toxics.

IDENTIFYING ACTIVE INDUSTRIES

Preventing ongoing pollution is much easier than cleaning up problems from the past. By looking at our current practices, we can discover how to protect the environment into the future and reduce some of the greatest risks to community health.

Now that we have identified the hazardous waste sites in a community, let's continue our profile by taking a look at working industries that use hazardous materials.

In this section we will consider how to identify where these industries are, whether chemicals they are using enter the environment, and if people might be exposed to them in ways that could cause harm.

Finding, sharing, and discussing this information in your community will help encourage pollution prevention. Note that it is legal to emit certain kinds and amounts of hazardous pollutants into the air, water, and land. However, for many hazardous releases, facilities must first register with the tribe, state and/or EPA, and obtain a permit. Citizens can often participate in permitting decisions. There are opportunities for public review and comment on permit requests.

Community Right-to-Know laws require important information on the storage and release of toxic chemicals be made available to the public to protect their communities. In addition to these permitted and intentional releases of chemicals, accidental releases also occur. Significant accidental releases must be reported, and these records are available to you. Emergency plans that are drafted to prepare for chemical accidents are also available for the public to review.

THE EPA'S TOXIC RELEASE INVENTORY (TRI)

The best first source of data for an overall snapshot of a town's larger industries is the EPA's Toxic Release Inventory (TRI).

What is the TRI? Under the federal Emergency Planning and Community Right to Know Act passed in 1986, several types of large industries must submit annual reports to the EPA estimating the amount of hazardous chemicals they release to the air, land, or water. EPA is required to make this information available to the public. The first year for which data is available is 1987. The TRI is updated every year; however, there is a time lag. If you are looking for 1996 information, you will find that it was reported by companies in mid-1997 and was available in early 1998.

The TRI is a computerized database, and is available through a number of sources that we will list later.

The public can use the TRI to get a list of chemicals reported as released to air, water, and land in their communities. Let's take a look again at Woburn, MA as an example. If we were to look up Woburn in the TRI, we would find that there were 27 facilities reporting in 2003. Below is one report for the chemical formaldehyde that was released by a facility in Woburn, MA.* It is provided as an example of one chemical reported by one facility. More than one facility and other chemical releases and transfers occurred in Woburn.

Table 2: Sample Chemical Report from Woburn, MA Toxic Release Inventory

Source: Right-to-Know Network (http://www.rtknet.org) 2005

FACILITY NAME	ADDRESS	CITY/STATE	ZIP
Kraft Foods, N.A., Inc	Hill St.	Woburn, MA	01891
PUBLIC CONTACT: Cathy Pernu	PHONE: (847) 646-3946		
CHEMICAL NAME: Ammonia			
CAS NUMBER: 007664417			

2002 RELEASE ESTIMATE

TYPES OF RELEASES	**IN POUNDS**
FUGITIVE AIR EMISSION	250
STACK/POINT AIR EMISSION	0
DISCHARGE TO WATER	0
UNDERGROUND INJECTION	0
RELEASE TO LAND	0
DISCHARGE TO POTW	250
OTHER OFFSITE LOCATIONS	1,770
TOTAL RELEASE & TRANSFER:	2,270

** Please note that this report is dated, and used only as an example. Current releases may be less.*
Source: U.S. Environmental Protection Agency 2003.

Note that the TRI reports include facility names and contact persons for chemicals released in a community. The report lists the names of each hazardous chemical used in large quantity by each facility. In addition to the chemical name is its "CAS number", which is used to uniquely identify the particular chemical. The TRI report lists how many pounds of each particular chemical was released or transferred offsite during the year.

In addition, the TRI Chemical Report tells whether the release was:

To Air:

- *Fugitive Air Emission* means the air release was from general evaporation. The chemical may enter air as it is being used or while it is stored.

- *Stack/Point Air Emission* means the pollutant was released through a stack at a specific location. Note that it may be possible to use some sort of control device on these emissions.

To Water:

- *Discharge to Water* means the pollutant was released into a surface water body such as a river, lake, or ocean.

Underground:

- *Underground Injection* means the waste material was sent into the ground. These may or may not enter underground water.

To Land:

- Land releases may include depositing waste in a landfill.

or To a Treatment Site:

- *Discharge to POTW* means the waste was sent to a sewerage system (known as publicly-owned treatment works).

- *Other Offsite Locations* refer to waste being sent to other locations that are not operated by the facility.

Here is a simplified list of all the chemicals reported in Woburn, MA in 2002. It combines the reports provided by all facilities in the city. Note that while some were releases to the community most were transferred offsite for disposal, treatment, or recycling.

Table 3: 2002 Release Summary from Woburn, MA Toxic Release Inventory

Chemical Name	Total Release or Transfer (in Pounds)
AMMONIA	2,371
LEAD COMPOUNDS	12,708
METHANOL	19,800
THIOUREA	No Amount Given
BENZO(G,H,I)PERYLENE	No Amount Given
POLYCYCLIC AROMATIC COMPOUNDS	No Amount Given
METHYL ETHYL KETONE	113,672
EHHYL ACETATE MIXTURE	14,189
N-HEXANE	2,029
TOLUENE	42,694
GLYCOL ETHERS	8,386
N-METHYL-2-PYRROLIDONE	18,074
SULFURIC ACID	206
DIISOCYANATES	5,282
Total Releases to the Environment	**16,126**
Total Transfers Offsite	**223,286**

Source: RTKNET (http://www.rtknet.org) based on data from U.S. Environmental Protection Agency 2004.

A list of releases in a specific community, like the one above in Table 3, can help your community identify potential pollution problems and consider options for reducing chemical wastes.

Another way you can use the TRI is to search for information about a particular disposal facility (an area landfill, incinerator, recycling center, or sewage treatment center, for example). For example, you can find amounts of chemicals from all reporting companies nationwide that send waste to the facility for disposal or treatment. You could do a similar search on a body of water. A group wanting to protect Boston Harbor, for example, looked at all the reported chemical waste disposed of directly into the harbor, into the Charles River, which empties into the harbor, and into the Deer Island Wastewater Treatment Facility located in the harbor.

You can also request additional information from the TRI, such as:

- Actions the facility might be taking to reduce their releases by preventing pollution and recycling chemicals.
- Total waste generation, and the amounts of chemicals that are recycled, used for energy recovery (burned for energy), and treated on-site. *
- The method of treating chemical wastes at the facility.
- Where chemicals are being transported offsite for recycling, treatment, or disposal, including the facility name and address, and the process being used.

WHICH FACILITIES MUST REPORT TO THE TRI

TRI is an invaluable source of data. However, it is important to be aware of its limitations. Not all industries are required to report to TRI; there are several requirements that industries must fulfill before they are required to report:

- They must have at least 10 full time employees.

- They must either manufacture or process more than 25,000 lbs. of listed chemicals or use more than 10,000 lbs. during the year. This reporting threshold has been lowered for certain chemicals that are dangerous at low levels and remain in the environment for a long time.

- Only certain kinds of facilities must report. Initially, these were only privately owned manufacturing facilities. By Executive Order effective July 1, 1995, federal facilities also must report. The EPA has also increased the types of facilities that must report. These include manufacturers such as metal finishers and chemical, textile, and paper producers, as well as metal mines, chemical wholesalers, oil and coal-fired power plants, hazardous waste treatment facilities, coal processors, solvent recyclers, and petroleum bulk storage sites.

WHAT CHEMICALS MUST BE REPORTED TO THE TRI

Note that, just as not all facilities must report, not all hazardous chemicals must be reported. As of 1995, about 650 toxic chemicals to be reported. While more than twice as many as were originally subject to reporting, these are not all of the toxic chemicals used in industry.

***** For Woburn, the total waste generated was 1,376,695. This total includes waste which was not reported in Table 3 above because it was not released or transferred. 964,486 was burned for energy on site, for example, and 15,583 treated onsite.

Note also that the TRI reports only the amounts of chemicals released as waste material to the environment. Information on the total amount of chemicals produced or used by facilities is generally not available. Furthermore, reported releases are based upon facility estimates, not direct measurements.

How to get the TRI data

There are several sources for TRI data. Below are good Internet sites. More sources are listed in the **JSI Environment and Health Resource Guide** in Appendix A.

- **Right-to-Know Network** (RTK-NET) (http://www.rtknet.org) Clear TRI summaries by community.
- **National Library of Medicine**® (http://www.nlm.nih.gov) TRI data and ToxMap to map locations in communities.
- **ENVIROFACTS** (http://www.epa.gov/enviro/), TRI and other EPA regulatory information. Enviromapper maps facility locations in communities.
- **Environmental Defense Scorecard** (http://www.scorecard.org) Includes how TRI and other chemical hazards in your county and state rank versus other areas of the country.

Chemical Use Data

If your state environmental agency has information on chemical use by local industries, this may help to complete the picture. These data, available in only a few states, report total amounts of the chemical used, rather than just the waste transferred or released to the environment. The reports may also include information on the processes that use the chemical. Where this kind of information about use and process has been available, it has helped to identify ways to prevent pollution in manufacturing, to reduce exposures to workers and consumers, and to minimize transport and ultimate disposal of hazardous chemicals used in both raw and finished products. Chemical use data also allows one to track what happens to all of the chemicals purchased and helps verify release estimates. While the TRI does not include the total amount of chemicals used or produced, it does have general information on the types of processes that generated or used reported waste chemicals.

Storage and Emergency Planning

The same law that created the TRI also requires additional information from facilities in the community on the maximum amount of the chemicals that are stored at any one time and on the company's plans in case of an emergency release or fire. The threat of terrorist attack makes this type of information even more important to communities.

This information is also required from many smaller facilities that are not required to report chemical releases to the TRI. The information is not in the TRI; it is available to the public through Local Emergency Planning Committees. Contact your fire department for information.

PERMITS AND INSPECTIONS

So far, we have looked at information from Community Right-to-Know laws about toxic chemical storage, release, and transfer. To get additional information about active facilities, especially facilities in industries that aren't covered by Community Right-to-Know laws, you may want to look at the environmental permits they've received for their activities.

Numerous federal, state, and even local laws require permits as well as other reports and inspections of facilities. For example, you can learn more about generation, treatment, storage, disposal, and transportation of hazardous waste from a wide range of facilities under the Resource Conservation Recovery Act (RCRA). RCRA requires permits for both small and large generators of hazardous waste, and for waste treatment, storage, and disposal facilities. RCRA also requires shipping manifests that you can review; manifests provide detailed transportation records for such materials.

Permits, records, inspections, monitoring information, and enforcement actions that arise from environmental laws are available through various tribal and state environmental departments and from the EPA. Contact the Public Information Officer in your state and/or tribal department of environmental protection to find out how to obtain permit information. Additional information can be gained from authorities that are not "environmental" agencies. You may want to contact your local fire department or the Occupational Safety and Health Administration (OSHA), for example, to learn more about the safety records for facilities in your area.

The Internet is becoming a particularly quick and easy way to get permit and regulatory information.

- EPA's **ENVIROFACTS** database is an example (http://www.epa.gov/enviro). Envirofacts contains links to water discharge permits; federal and/or state and local air permits, emission data and facility compliance information; as well as information on small and large hazardous waste generators.

- EPA's FINDS database has identification numbers for all facilities with permits from the EPA.

- The **Right-to-Know Network** (RTKNET) (http://www.rtk.net) also has many of these and other EPA regulatory databases. One of the databases in RTK-NET is called DOCKETS. DOCKETS has information on civil proceedings that EPA has filed to make companies comply with permits and regulations. By entering your town or zip code, you can search ENVIROFACTS or RTK-NET for records about facilities in your town.

- **National Environmental Policy Act**
  http://www.epa.gov/compliance/nepa/index.html EPA site where you can review proposed new projects that might impact the environment.

- **Federal Register** http://www.epa.gov/fedrgstr/index.html Provides notifications of proposed environmental actions or permit decisions.

Some other permit and inspection records, especially in tribal governments and states where they are not computerized, may not be so easy to get. You may need to travel to the agency's office to look at the records. You also might first need to file a Freedom of Information Act (FOIA) Request that allows public access to most government records (See Appendix B for how to file a FOIA request).

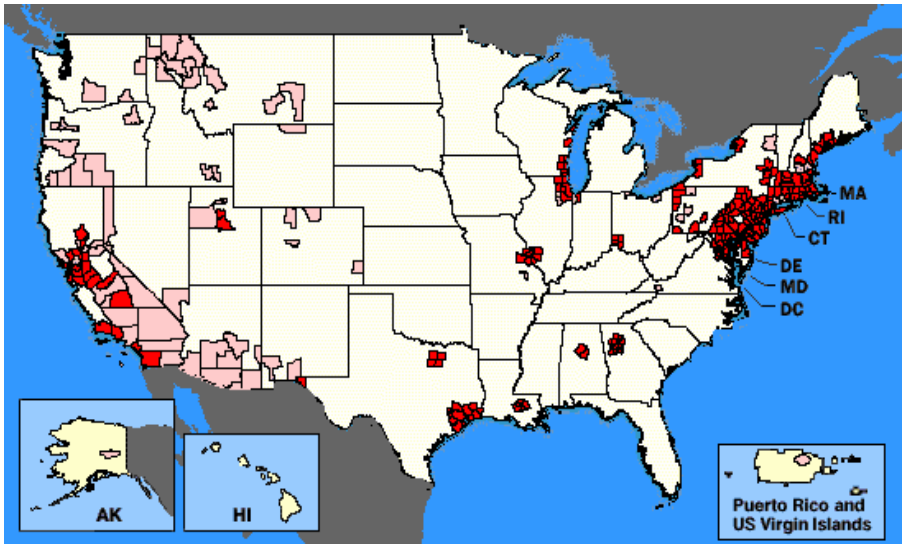
Table 4: Types of Facilities Listed in EPA Permit Databases

RCRIS	Facilities which generate or treat hazardous waste (includes small facilities such as gas stations or dry cleaners as well as larger facilities)
PCS	Facilities with water pollution permits
AFS/AIRS	Facilities with air pollution permits
FATES	Pesticide distributing facilities
FFIS	Regulated federal facilities
CICIS	Chemical manufacturers

AIR QUALITY

The TRI and monitoring reports for facilities with air permits give information on industrial releases into the air. However, they do not tell you if these releases happen in heavy bursts, or in slow continuous releases. You won't know if the emissions mix with the air and are dispersed over a wide area, or stay trapped near the ground. In other words, while these reports provide you with information on what is released, they do not tell you what you are actually exposed to. Although you know what is emitted, you do not know the actual quality of the air you are breathing (called ambient air quality).

Important information on ambient air quality is available for the chemicals regulated as regional pollutants under the Clean Air Act: carbon monoxide, hydrocarbons, oxides of nitrogen, sulfur dioxide, ozone, particulates, and lead. Levels of these pollutants in the environment are measured from air monitoring stations established in selected locations (see map below). Additional air quality monitoring may occur for other toxic chemicals in your area. For pollutants that are monitored, you should check whether air-monitoring stations are close enough to reflect with accuracy conditions in your neighborhood. If not, you may be able to arrange with universities or government agencies to conduct local monitoring. For monitoring information, contact your tribal or state division of air quality, which is usually a division within the department of environmental protection. Air monitoring reports and the EPA's Office of Air Quality Planning and Standards can also be reached on the Internet (through the EPA web site at http://www.epa.gov).



Air Quality Map

Map Legend

County above standards

Part of County above standards

Source: **Scorecard**
http://www.scorecard.org

Air Quality Resources:

Air Pollution Data (http://epa.gov/air/data/index.html)

Toxic Air Pollutants (http://epa.gov/air/toxicair/index.html)

Indoor Air Quality (http://www.epa.gov/iaq/index.html)

Radiation (http://www.epa.gov/radiation/index.html)

Environmental Defense Scorecard (http://www.scorecard.org) Environmental Defense offers a Scorecard that provides maps and information about air quality in U.S. communities. Includes where pollutants come from in your community, what their human health effects are, and what actions you can take.

Tribal Air Monitoring Support Center (http://www4.nau.edu/tams) Technical assistance to tribes on air quality and environmental monitoring.

Federal Citizen Information Center, 1-800-FED-INFO (1-800-333-4636)

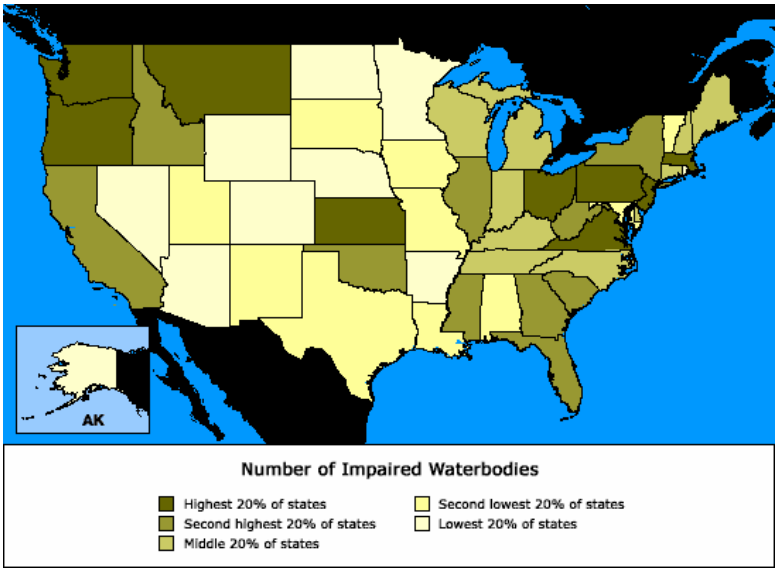
http://www.firstgov.gov/ Provides listings of state agencies by topic.

WATER QUALITY

The water supply is another important route by which people can be exposed to hazardous chemicals.

Sources of water pollution are diverse, ranging from road runoff, leaking fuel storage tanks and pipelines at homes and small businesses, and municipal landfills, to permitted and accidental releases from industrial and mining operations. These pollutants can enter both surface waters (such as lakes and rivers) and groundwater (which is underground and may be pumped from wells for use).

Similar to air releases, the TRI and various permit information can inform you about discharges to water, but not the resulting water quality itself. Water quality information is collected by tribal and state environmental or health agencies.



Water Quality Map
Source: **Scorecard**

DRINKING WATER QUALITY

Contact your water department, tribal or county health department, or state department of the environment to request data on the quality of your drinking water supply. State, tribal, and federal laws require that public water supplies be tested at specific intervals, and that suppliers inform you of any contaminants found. Information on water supply contamination is available to the public in a national database. If you have your own private drinking water well, you may have to arrange yourself to have the water tested. Tribal, municipal, or state agencies may help provide testing for your private well.

Note that while not all hazardous chemicals are tested for on a regular basis by public water suppliers, a substantial number of over 100 most common chemical and biological contaminants are routinely monitored. Some communities, universities, and nonprofits perform additional tests for water quality. They measure more types of contaminants than what most communities require.

WHAT IF MY DRINKING WATER IS CONTAMINATED?

If you do have contaminants in your drinking water, how serious a problem is it? To find out, you can first compare the levels of contaminants found to state, tribal and federal drinking water standards and to health advisory levels. If your drinking water's level is higher than these, it would be of concern. If it is lower, it depends on the chemical whether the water might, or might not, pose a health risk. Maximum Contaminant Levels (MCL) are the standards required for public drinking water quality. While these standards take into account health risk, they do not require that contaminants be at a level of no risk. In addition, there are goals set (Maximum Contaminant Levels Goals - MCLG) that are based even more strongly on health risk. While not requirements, these goals may be set at even more protective levels than standards.

Tribes and states issue health advisories when chemicals in water pose a risk serious enough to call for public health action. Health advisories may warn whether water is safe for drinking, recreation and other activities such as fishing.

For some contaminants found in drinking water, using a home water filter or buying bottled water can reduce your exposure. Others, especially those that evaporate (volatize) into the air, can still be a problem when you use your shower or washing machine. The best protection is to work as a community to make your drinking water supply and other water bodies safe.

For more information, and for copies of advisories and standards, contact the Federal Drinking Water Hotline: 1-800-426-4791.

QUALITY OF WATER FOR FISHING AND RECREATION

Even when water is safe to drink or wash with, fishing may not be safe. For many water bodies across the nation, there are advisories warning against eating certain fish. Even when there are low levels of toxic chemicals in water, the chemical may build up to high levels in some fish (called bio-accumulation). As small fish take up the contaminant, larger fish eat many small fish. These chemicals store in the bodies of the fish reaching higher and higher levels over time. This is the case for mercury, which fish store in their body. Pregnant women and children are at highest risk from eating fish that have high levels of mercury. There are advisories across New England to warn about mercury in certain types of fish caught in fresh water for these sensitive populations.

PROTECTING WATER RESOURCES

To protect water, you need to protect watersheds. Watersheds are the areas, including lands, through which water drains as it makes its way into a specific body of water.

While you are investigating the quality of your drinking water supply, get a map of where the watersheds in your area are located. Find out whether there are threats such as underground storage tanks, gas stations, hazardous waste sites, untreated waste water, or road drainage outfalls, near a supply well or reservoir.

In addition to drinking water, you may be concerned about rivers and lakes used for fishing or recreation only. For information on pollution in these waters, contact the tribal and state environmental agencies. Ask about programs, such as Adopt A Stream or watershed associations, whose mission is to improve water quality in specific water bodies.

Water Quality Resources

- **Watershed Information Network** (http://www.epa.gov/win/active.html) information about partnerships in watersheds, data, and community projects.
- **Protecting Public Health and Water Resources in Indian Country** (http://www.epa.gov/waterscience/tribes/strategy.pdf) EPA/Tribal partnerships; how to set tribal water quality standards and fish advisories.
- **Fish Advisories** (http://www.epa.gov/ost/fish/) Lists safety of eating fish caught in waters across the country. Provides warnings for the general public and for populations who may be at higher risk from eating contaminated fish.
- **Environmental Defense Scorecard** (http://www.scorecard.org) Provides maps and information about water quality in U.S. communities. Includes where pollutants come from in your community, what their human health effects are, and what actions you can take.

INDUSTRIAL HISTORY

The sources of data discussed so far can shed light on the current state of environmental affairs in your community. If you are investigating contaminants that might have caused cancer, you will want to know what was going on ten or more years ago. Historical information on the environment is very scarce. Before the 1980's the ability to test for many important organic contaminants was limited (organic chemicals are those that contain carbon and are used in many toxic industrial compounds).

An important method used to trace the history of environmental contamination is to look at the industrial history of the area. Several sources of information are helpful:

- Long term residents are often the best experts on how the community has changed over time.
- Community annual reports, in some towns dating back to the 1800's, describe the types of industries, and how much they produced.
- Clerk and assessors offices maintain records of past land use.
- The fire department has copies of past and present flammable material permits, location of underground storage tanks, and incident reports.
- The state board of health has detailed reports, sewer permits, and inspection records for each city and town.
- Local libraries have old newspaper articles of interest, insurance maps, and other old city maps that show the location of industries over time.
- Local historical societies and trade associations are further sources of information.

Industrial History Resources:

MAPS: GIS Windows on Native Lands, Current Places, and History (http://www.kstrom.net/isk/maps/mapmenu.html) Links to useful historical, cultural, and political maps. Valuable maps of American Indian and Native Alaska lands and environmental impacts.

LOCATING POLLUTION SOURCES: SECTION SUMMARY

So far, we have several ways to get information on hazardous waste sites, current and past industrial practices, and air and water quality in your community. A number of environmental databases available through area libraries can be useful, readily available first sources of data. Other important sources of information we discussed include:

- Long-term residents
- Boards of health, fire and engineering departments, emergency planning councils, and libraries;
- Tribal and state departments of the environment and public health; and
- Federal agencies such as the Environmental Protection Agency.

It is easier to start at the local level and work up to the state and federal level if necessary. Find out whether environmental and activist organizations already exist that can help you. Thousands of citizens' organizations have formed around issues of hazardous chemicals. For the location of groups in your area, contact the Public Interest Organizations listed in the **JSI Health & Environment Contact Guide** in Appendix A.

WEIGHING RISKS

Once you have information on contaminants in your community, it is important to focus your efforts on those sources and materials that may pose the greatest health threat.

Several factors should be considered in order to identify the most dangerous sources. In this section, we will discuss each of these factors as we look at the Toxic Release Inventory for Woburn, MA. While we discuss the TRI, which applies to active industries, the same general principles apply to hazardous waste sites or other sources of contamination.

We will use a simple example to illustrate. In real life, it can be very difficult to sort through all of these factors. Consulting with environmental health professionals from environmental firms, universities, nonprofits, and/or government agencies may help in this process.

Some of these experts may discuss conducting a risk assessment. These are done to try to attach a number to the risk (such as: one cancer death would be expected in a million people exposed to a specific hazardous release). Risk assessments may be helpful because they are based on research and expert knowledge. However, risk assessments may also involve many hidden assumptions, and often there may not be enough information to do them well. Many communities prefer, instead, what is called risk screening. This involves identifying in general terms community priorities as a basis for taking action. Risk screening offers more opportunities for the public to make decisions.

This section describes some of the general factors that are used in risk screening to compare risks. These factors are particularly important to keep in mind when considering potential risks that a chemical may pose:

- Toxicity
- Amount
- Duration of Exposure
- Routes of Exposrure
- Who is Exposed

TOXICITY

The toxicity of a chemical means how poisonous it is. It predicts the adverse effects of the chemical at specific exposure levels. While many chemicals are regulated as hazardous, some cause more serious impacts on health and the environment.

It is important to consider the types of health problems known or suspected to be caused by the chemicals on a TRI list. Chemicals that cause serious health problems, even in very small amounts, should be given a higher priority in any investigation. At the end of this section, we list sources for obtaining information on chemical toxicity.

Below is a relative toxicity chart that lists categories of toxicity and provides examples. It is based on levels known to cause death. These are measured in two ways: by LD50, which is the dose of a substance that causes death in 50% of a population of test animals, and by the average lethal dose for humans. Note that there are other ways of measuring toxicity that consider factors other than the lethal dose, for example, the dose that causes any known adverse health outcome. This level may be of more useful in protecting your community, but can be harder to find.

Table 5: Relative Toxicity Chart

Toxicity Rating	**LD50 (mg/kg)**	**Average Lethal Dose for a 155 pound human**
Extremely Toxic *dioxin, arsenic trioxide, nerve gasses, botulism toxin*	<1	7 Drops
Highly Toxic *mercury salts, strychnine*	1-50	7 drops - 1 tsp.
Very Toxic *DDT, lead salts, caffeine*	50-500	1 teaspoon - 1 ounce
Moderately Toxic *ferrous sulfate, ether, nicotine*	500-5,000	1 ounce - 1 pint
Slightly Toxic *ethyl alcohol, soaps*	> 5,000	> 1 pint

It is important to note that in the real world, people can be exposed to many different chemicals at once. Unfortunately, the health effects of exposure to multiple chemicals may not be known. We are just beginning to study effects of combined chemical exposure.

Let's look at some of the chemicals reported in Woburn, MA's to the Toxic Release Inventory (TRI). Table 3 below looks at the health effects of four of the chemicals we found were reported in Woburn's TRI in the previous section on Locating Pollution Sources. The toxic effects of these chemicals may cause damage to the heart (cardiovascular), lungs (respiratory), or the brain (neurological). They may affect the ability to have children (reproductive) or interfere with a child's healthy development (developmental). A toxicologist looking at the list would note that of these chemicals, lead is among the most highly toxic and is recognized to cause cancer and many other types of health effects.

Keep in mind that while these chemicals may pose a risk to some people, they will not always cause health problems. We are all exposed to certain chemicals that are toxic. Most of the time these will not affect our health. It is not helpful to be worried, but it is important to reduce chemical exposures.

Table 6: Health Effects of Four Chemicals Reported on the Woburn, MA 2002 Toxic Release Inventory

Chemical Name	Known or Suspected Health Effects:	Hazard Ranking
LEAD COMPOUNDS	Cancer, heart, respiratory, and other	**High**
POLYCYCLIC AROMATIC COMPOUNDS	Cancer, reproduction, Heart, liver, and other	**High**
AMMONIA	Reproduction, respiratory, damage to nervous system skin, and liver	**Low-Moderate**
METHYL ETHYL KETONE	Child development, Heart, liver, and other	**Low-Moderate**

Information Source: Environment Defense Fund, Scorecard (http://www.scorecard.org)

At the end of this section, we will discuss how you can find facts about chemicals yourself, or locate experts that may help you.

AMOUNT

The amount of a hazardous chemical present is an important consideration. You can use the TRI to find the amount of each chemical that facilities are releasing and to encourage reductions.

Note that if one type of chemical on your TRI list is released in greater amounts than another it does not necessarily mean that it is more dangerous. One needs to consider other factors, such as the individual toxicity of each compound, and who is exposed. A thousand-pound release of a highly toxic compound may be of greater concern than a hundred thousand-pound release of a less dangerous chemical.

Let us again use the TRI list for Woburn as an example. The table (below) shows that large quantities of methyl ethyl ketone (MEK) were reported in 2002 by Woburn industries. MEK, however, is not highly toxic. Polyclyclic aromatic compounds, on the other hand, are highly toxic; yet no actual amount of release or transfer was reported. Lead is among those most dangerous as a known cancer agent with the highest risk of other health effects, and a fairly high amount was reported.

Table 7: 2002 Release Summary from Woburn, MA Toxic Release Inventory

Chemical Name	Total Release or Transfer (in Pounds)
LEAD COMPOUNDS	12,708
AMMONIA	2,371
POLYCYCLIC AROMATIC COMPOUNDS	No Amount Given
METHYL ETHYL KETONE	113,672
Other Chemicals	110,660
Total Releases to the Environment	**16,126**
Total Transfers Offsite	**223,286**

Source: RTKNET (http://www.rtknet.org) based on data from U.S. Environmental Protection Agency 2004.

DURATION OF EXPOSURE

In general, the longer one is exposed to a toxic chemical the more likely one is to experience health problems. We would be interested in finding out how long the companies on Woburn's TRI list have been in operation and how long they have released these chemicals. We also would like to know if the releases occur slowly and consistently, or in periodic, heavy bursts. You might need to contact the company or environmental regulators to learn this type of information.

PERSISTENCE

Persistence of the chemical — how long it remains in the environment — is also important to length of exposure. Some chemicals are broken down rapidly by sunlight, water, or bacteria into less toxic forms, while others may remain in the same form for a long time. Alternatively, some chemicals may form by-products that are even more toxic when they decay.

Chemicals that persist in the environment may provide the potential for exposure for many years. These chemicals can bioaccumulate (build up to high levels in the food chain) and lead to greater exposures. For example, fish eating sediment contaminated with PCBs can build up higher and higher levels in their fat over time. The fish you eat may have much higher concentrations of PCBs than the sediment itself. Persistent chemicals may also become stored in your body, contributing over time to an increased body burden (amount of chemical in your body at a given time).

Let us consider what happens to the chemicals in our Woburn example, once they enter the environment. Methanol and ammonia released to the air will quickly break down into other chemicals. Fortunately, some of these are harmless and no longer of concern. However, some of the newly-formed chemicals can create smog air pollution that may still be a concern for resident health if levels are high. Your environmental department may be able to provide more information about what happens to chemicals in the environment and the concern they may or may not pose.

ROUTES OF EXPOSURE

Routes of exposure are the pathways by which materials may enter the air we breathe, the water we drink, the food we eat, or contact our skin. The TRI cannot tell us precise routes of exposure, but it generally does indicate whether chemicals were released to air, land, or water.

For a release to water, you will want to investigate whether people might drink the water, swim in it, or catch and eat fish from it. For air, you will want to consider who lives, works, or goes to school downwind. Contaminated land will be a concern to those who eat food grown in it or are exposed to soil dust. Note that some chemicals, called

volatiles, can move into the air from water or soil. This means that one could be exposed if one lives above contaminated water or soil or as he/she uses the water for showers or for washing dishes or clothes.

Consider how people could be exposed: By air, drinking water, direct contact, or the food chain? At home, work, or school? Through transportation or facility accidents?

Note that health effects may differ depending on whether one eats, drinks, touches, or breathes the chemical.

For example, one may be exposed to a very high concentration of lead by touching a solid block. However, the lead in this solid block form will not harm him/her. If one were to start sanding the lead, on the other hand, and breathed in the dust, it would be dangerous.

The risk from exposure to hazardous materials therefore depends on:

- Whether the substance is in a form that can cause toxic effects (bioavailability);
- How one comes into contact with the substance;
- The other factors we have mentioned: the toxicity, amount, and duration of exposure.

So far, we have noted that lead is a highly toxic compound reported in large quantity in Woburn's 2002 TRI. Once in the environment, it is persistent. Is it a health threat to residents? It turns out that almost all of the lead reported was transferred offsite for recycling or disposal (12,707 pounds). Only about one and a half pounds were actually released to the environment in Woburn. We would therefore not be very concerned about general resident exposure to the lead reported that year. Our concern would be whether workers were exposed using the metal and whether any of the lead eventually entered the environment in another location upon disposal. We might also want to learn about whether there might be potential for the lead to be released in Woburn in the case of an accident or future release. We might ask: "Is the lead used as a solid or a liquid? Is it is ever sanded or heated? How is the lead stored and transported? Have there ever been any accidents involving lead?"

WHO'S EXPOSED: SENSITIVE POPULATIONS

It is important to think about who may be exposed to toxic chemicals in your community. The more people that are exposed, the more likely that health problems could occur. Some people are particularly vulnerable to exposure. Children, elders, and those with pre-existing health problems are more susceptible to health effects from toxins. Children are placed at unique risk, often at lower levels of exposure than adults, due to their physiology, their small size and the developing state of their bodies. They also may come into contact more easily with certain contaminants. For example, they explore by putting their hands and objects in their mouths. If these items have

contaminated dust on them they can be swallowed. In Woburn, we would want to know, for example, whether many people live downwind of facilities releasing chemicals to the air. Are there schools, daycare centers, homes of elders, or hospitals in the area?

INFORMATION ON CHEMICALS

Information on the toxicity of chemicals can be obtained from several sources. Chemical substance fact sheets developed by the state of New Jersey and by the EPA are particularly clear and helpful. These fact sheets are available for over 1,000 chemicals, including all of the chemicals reported to the TRI. The EPA fact sheets can be found on the TRI CD-ROM or through the EPA's Office of Pollution Prevention and Toxics.

Chemical Information Resources:

The **Scorecard** (http://www.scorecard.org) website of the nonprofit, Environmental Defense, has easy to use, valuable information on the toxicity of chemicals. You can search their site for hazards in your community, and the site will provide information on both the chemicals present and their health risks. They will also rank the chemicals based on which are most hazardous. In addition, the following are useful:

1) **Poison Control Centers** (http://www.aapcc.org), listed in your phone book, have important emergency information, and can refer you to additional information about the toxicity of chemicals.
2) **TOXFAQ Fact Sheets** are very useful Public Health Statements and Toxicology Profiles that have been prepared on specific hazardous chemicals by the Agency for Toxic Substances and Disease Registry. (1-888-422-8737); http://www.atsdr.cdc.gov/toxfaq.html)
3) New Jersey Chemical Fact Sheets are also written for public use, and available from the:
   New Jersey Department Of Health
   Right to Know Program
   Post Office Box 368, Trenton, NJ 08625-0368
   (609) 984-2202
4) **The Right to Know Network** (http://www.rtk.net) makes chemical fact sheets from NJ and the EPA available on the Internet. Also try a general Internet search for the chemical.
5) **Material Safety Data Sheets** (MSDS) are required of all manufacturers of products containing hazardous chemicals. You can obtain MSDSs from your state health department, state emergency response commission, or from industries that use the chemical. Note, however, they may have less complete or clear information than other sources of chemical information.

6) **Where to Find MSDS on the Internet** (http://www.ilpi.com/msds/index.html) This site includes an index of free sites where material safety data sheets (MSDS) can be found as well as background information on MSDS (e.g., how to interpret MSDS) and a glossary of terms found in MSDS.

7) Health hotlines can offer information on risk factors for specific health concerns. For example, the **Cancer Information Service Hotline**, sponsored by the National Cancer Institute, can be reached at 1-800-4-CANCER; (http://www.cis.nci.nih.gov/).

8) Health studies have been conducted on many chemicals, and are contained in several online databases and reference books. You can get many of these from the **National Library of Medicine**® (NLM). NLM® makes a number of databases on health and chemical toxicology available to the public. ***MedlinePlus***® is one of the most valuable NLM databases, with a wealth of information on health conditions including studies of chemical hazards. Through their website (http://www.nlm.nih.gov), you can search ***MedlinePlus*** free on the Internet. **The National Network of Libraries of Medicine**® (NLM) has detailed chemical research on their TOXNET® database (http://www.toxnet.nlm.nih.gov). You can call NLM® (1-800-338-7657) to find libraries in your area that can help with access to chemical and health databases and reference books.

9) Risk assessments are detailed estimates of the risk from exposure to specific hazards. They may be prepared for specific pollution sources, such as hazardous waste sites or newly proposed industrial facilities, to examine the risks they pose to health and the environment. Risk assessments are available from the federal and state health or environmental agencies that regulate the pollution source. See the **JSI Health & Environment Contact Guide** in Appendix A.

WEIGHING RISKS: SECTION SUMMARY

When weighing the risks a chemical may pose to your community, there is a lot of information to consider. Each of the five factors discussed in this section — toxicity, amount, duration, routes of exposure, and who is exposed — are important. For some chemicals, there are huge volumes of information available. For others, very little is known.

Assistance may be available from nonprofit health organizations, environmental groups, universities, or public agencies. People in these organizations, groups, or agencies who work regularly with toxic chemicals may be able to guide you through the complex process of identifying the most dangerous chemicals and potential exposure scenarios.

As you decide how to focus your efforts, another important consideration is how easy or difficult it would be to eliminate or decrease exposure to the types of toxic chemicals.

Negotiations with industry may result in source reduction. This effort can be aided by industrial hygienists who inspect facilities, recommending safer methods of production. You may be able to get the help of an industrial hygienist from your state, tribal environmental department, or area universities. A few states, for example, have established specific agencies to assist communities and industries. Ask your state department of the environment if such services are available. In Massachusetts, for example, there is a state Office of Technology Assistance that consults with industry to prevent pollution, and the Massachusetts Toxics Use Reduction Institute was established by legislation in 1989 at the University of Massachusetts at Lowell to help research alternative technologies and to train specialists.

ASSESSING THE HEALTH STATUS OF YOUR COMMUNITY

In this section of the tutorial, we discuss routinely collected health data, and how you can use them to describe community health. First, we will describe the kinds of health data that are routinely collected. Then we will explain how to analyze these data to draw some conclusions about community health.

Another way to assess community health is a community health survey. We will not discuss community health survey techniques in this tutorial. For information on how to do a community health survey, see Chemical Alert! A Community Action Handbook, edited by Marvin S. Legator and Sabrina F. Strawn, University of Texas Press, 1993.

Connecting health impacts to specific hazardous exposures is always very difficult. In Woburn, it has taken many years of study and hundreds of thousands of dollars to confirm that the leukemia in children was related to contaminated well water. Because of the many limits to health studies, you may never be able to know whether a hazardous site or chemical release has had an effect on health.

Nevertheless, it is useful to learn what health problems exist in your community. If health problems, such as asthma, are elevated in your community, and if you are not able to determine why rates are so high, you can still act to reduce known risk factors. Efforts to address irritant outdoor pollution and poor indoor air quality, and to reduce smoking could help reduce asthma rates. Your community might also think twice about the impact of siting any proposed new exposure source, such as an incinerator, in the area.

In this section, we describe how you can find out the status of health in your community using routinely collected health statistics, such as:

- Birth Outcomes
- Cancer Rates
- Mortality Rates (Causes of Death)
- Rates of Disease

We will then discuss how to interpret and analyze health data.

BIRTH OUTCOMES

Birth records contain information on all live births (see below for an example). The actual format of a birth certificate varies by state, but birth records generally contain certain useful information for health investigations, such as: sex, residence of parents, birth weight, and occurrence of birth defects.

Birth weight and birth defect ("Abnormal Conditions of Newborn") information are frequently used to investigate impacts of hazardous chemicals on reproduction. Birth defects can result from specific hazardous exposures, but they are uncommon. There may not be enough similar defects occurring in a small community to provide enough data for study. Low birth weight is easier to study. The weight of newborns can be very sensitive to certain hazardous exposures. There are likely to be more cases of low birth weight in a community, which can help researchers draw conclusions in a study. These studies, however, must also consider many other factors.

Example of Information on a Standard Birth Record:*
Facility Name and Address, Type of Practitioner
Child's Name and Address
Child's Sex
Plurality(Specify Single, Twin, etc.) and Birth Order(if not single)
Time and Date of Birth
Birth weight
Abnormal Conditions of Newborn
Mother's and Father's Name/Residence Address/Place of Birth/Date of Birth/Race and Ancestry/Education
Medical Risk Factors
Methods & Complications of Labor and Delivery
Mother's Occupation Past Year
Father's Occupation Past Year
Prenatal Care
Prior Live Births
Mother's Use of Alcohol or Tobacco During Pregnancy

**Note: This information may not be available on older records.*

Birth records are confidential in many states to protect individual privacy. If so, it is not possible to access medical information on the individual birth records. Therefore, you could not look at birth records from your town to record the number of birth defects in an area, for example.

However, your tribe or state department or board of health can analyze these data. They may publish yearly rates for your community compared to other areas for these reproductive health outcomes. If not, ask if they generate these comparisons for you. We want you to be aware that these data exist, and are available to researchers examining health in your community (such as your local board of health, state department of pubic health, university researchers, or consulting firms hired by your community).

CANCER RATES

All states have birth and death records. A growing number of states also have cancer registries. When a person is diagnosed with cancer, that person (referred to as a "case") must be reported by the hospital to the central registry. These data are called incidence data (when a person is newly diagnosed with a disease), as opposed to mortality data (when a person dies) or prevalence data (how many people in an area currently have a disease). Incidence data are the most useful information for study because the data are collected sooner than mortality data. Also, mortality and prevalence data can be more affected by factors such as access to, and quality of, health care.

A typical cancer registry record includes the patient's name and address, type of cancer, age occupation, and whether the person smokes.

Most of the information on the cancer record is confidential. It is not possible to get a list of people with cancer in your town. You also cannot get the data even if it has no name attached to it, if it still might allow someone to identify who that person is. For example, it is not possible to get a list of street addresses of people with cancer. However, it should be possible to get the number of people in your community with cancer, by year and by type of cancer.

Cancer registries (also known as tumor registries) usually publish an annual report, which is available through the state department of health. You can also request unpublished data tailored to your specific needs. Data availability varies by state. Many cancer registries do not have the staff to fulfill special data requests. If you are planning to use cancer incidence data, contact a public information person at your department of health. Describe your information needs and ask how to apply for data.

Here is sample cancer registry report for Woburn:

Woburn, Massachusetts

1982-1989 Combined Report

City of Woburn	Leukemia #Cases	SIR	Lung #Cases	SIR	Breast #Cases	SIR	Bladder #Cases	SIR	All Cases Cancer
Males	20	162	144	132	4	_	45	126	630
Females	11	110	62	94	165	85	15	105	628
Total	31	139	206	118	169	87	60	120	1258

EXPLANATION: For each type of cancer, the table shows #Cases — the number of individuals diagnosed with cancer during these years — and the SIR — Standardized Incidence Ratio — the ratio of the number of cases observed compared to what would be expected in the town based on state rates. A SIR equal to 100 means the rates are the same as state rates. A rate over 100 (such as 139 for total leukemia) means there are more cases (39% more leukemia) than state rates would predict. A rate under 100 (such as 87 SIR for breast cancer) means there are fewer cases than state rates would predict(13% less breast cancer). More discussion of interpreting data follows, under the topic “Interpreting Health Data.”

It is helpful to look at the rates for individual types of cancer, such as leukemia, since each type of cancer may have different causes. If you live in a small town, however, some data might not be given to you because of “small numbers”. For example, if you request the number of people diagnosed with a rare form of cancer and there were only two people in your town diagnosed in one year, the information may not be accessible. This is because it is thought that small numbers might violate confidentiality. For example, New Hampshire abides by “the rule of three” — any number of cases less than three is not released. The problem of small numbers may be avoided by grouping different types of cancers together so that the numbers are bigger.

MORTALITY RATES

Information contained in death certificates is another good source of data for investigating health problems. In many states, death certificates are public record. Anyone can look at them and can use any relevant information for a health study. Analysis of mortality data can be a good first step in analyzing health problems, particularly if cancer incidence data are not available.

The typical death certificate includes the following information that is useful in a health study: age, sex, race, cause of death, date of death, address, and usual occupation of the deceased.

A TYPICAL CERTIFICATE OF DEATH INCLUDES:

DECEDENT NAME

DATE OF DEATH

USUAL RESIDENCE

PLACE OF DEATH (CITY, COUNTY, HOSPITAL)

SEX RACE MARITAL STATUS OCCUPATION

DATE OF BIRTH AGE BIRTHPLACE

SOCIAL SECURITY #

CAUSE OF DEATH, INCLUDING:

DISEASE OR CONDITION DIRECTLY LEADING TO DEATH,

UNDERLYING CAUSE(S), AND OTHER SIGNIFICANT CONDITIONS.

Death certificates are kept at a number of offices. Call your local health department and ask how to find the office with vital statistics nearest to you. Also, ask what public reports they have available. Like birth outcome and cancer incidence information, reports that list and discuss rates for your area may be available. If not, you may want to ask the county, state, and/or tribe to analyze the causes of death in your community and compare the rates to other areas. In many areas, you can look at death certificates yourself. However, some areas do not allow public access to death certificates. In states that do make data available to the public, you may be able to request special data (for example, the number of people who died in your section of town from cancer in a given time period, or the addresses of people who died of cancer).

RATES OF DISEASE

Rates of various acute (short-term) and chronic (long-term) health problems can be related to hazardous exposures. These include asthma, which can be related to both indoor and outdoor air pollution, and lead poisoning, which can be caused by lead in paint dust, soil, food, and water. We are continuing to learn more about these, and a range of other health conditions, from heart disease to child developmental disorders, that might arise from specific exposures.

Many agencies collect data on some of these preventable health problems. Most often, the information is collected from hospital admissions and discharges. Find out from your local board of health, state vital statistics office, or Indian Health Services office whether these data are collected. Some states now print reports on comparative rates of these preventable diseases in different neighborhoods within a city or town for you.

If these data are not regularly collected, you might request that your health agency conduct a health study to look into health center or hospital discharges. Some advocates conduct their own health survey of residents to get this information.

Here is a sample list of preventable disease rates within the city of Boston, MA.

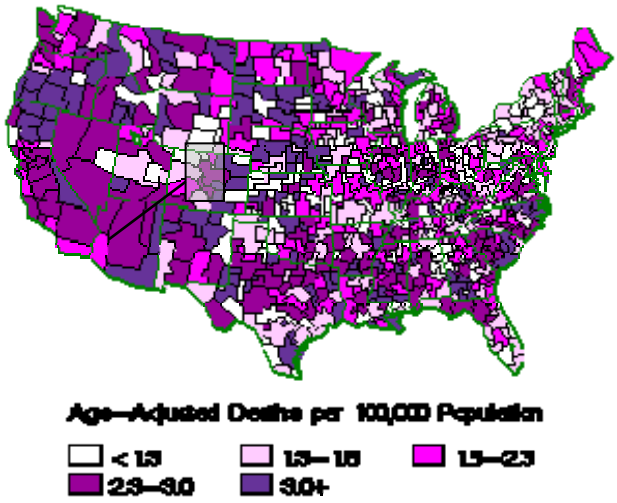
Boston, MA Preventable Diseases, 1993

	Boston	Statewide
Population Below Poverty	18.7%	8.9%
Asthma (Cases per 100,000 persons)	599.8	342.2
Elevated Lead Levels in Children (per 1,000 screened)	5.5	2.5
Low Birth Weight (<2,500 grams)	8.3%	5.9%
Infant Mortality (Deaths per 1,000 live births)	8.4	6.5
Total Cancer Deaths (per 100,000 persons)	159.1	138.4
Cardiovascular Disease Deaths (Deaths per 100,000 persons, adjusted for age of population)	187.6	169.5

EXPLANATION: The table shows the rates of diseases considered to be preventable that occurred in Boston during 1993. Because age greatly affects rates of some diseases, their rate was adjusted for the age of the residents in the community. Therefore, the rate is not the actual number of people who died of cardiovascular (heart) disease. It uses the actual number of persons who died of such disease, and calculates a rate for every 100,000 residents assumed to be certain “standard” ages. If the community is smaller than 100,000 people there would be less actual cases, if larger there would be more. If the ages in the community are not the “standard” ages, the actual number of cases would also differ. The table shows that rates of these preventable diseases are all above rates in the state. The accuracy of these rates depends upon the accuracy of diagnosis and reporting in these areas.

ASTHMA RATES

Asthma rates are now being collected by many states. The National Heart, Lung, and Blood Institute collects state data to create **Asthma Maps** (http://hin.nhlbi.nih.gov/asthmaps/_astmaps.html). Below is a sample map of U.S. rates of asthma deaths by county from 1996 to 1998.



Asthma Mortality

by Health Service Area, 1996-1998

Source: National Heart, Lung, and Blood Institute, Asthma Maps

(http://hin.nhlbi.nih.gov/asthmaps/_astmaps.html)

LEAD POISONING

Many local areas have information on lead poisoning in children less than 6 years of age. Current federal law requires that all children enrolled in Medicaid (health care assistance) be screened for lead at age 12 months and 24 months (or through 72 months if the child has not been previously screened). Unfortunately, this information still has not been collected in all areas.1 Communities in these areas may be able to get support from state or federal agencies to identify lead in older homes and to screen children for lead poisoning.

1 National Conference of State Legislatures, Lead Screening for Children Enrolled in Medicaid: State Approaches, 2002

Health Status Resources

Communities, regions, and states gather information on local health. The following may collect and make local information available. Search for your area health agencies on the Internet or locate their phone numbers and addresses to contact them for information. See the **JSI Health & Environment Contact Guide** in Appendix A for listings.

- Boards of Health
- Local health centers and hospitals
- City, town, and tribal health departments
- Counties and regions (through Health Service Areas and Prevention Centers), and
- State health departments

Locate the above through: **First.Gov**, the U.S. government's official web portal (http://www.first.gov). Also helpful may be:

National Association of Boards of Health (419) 353-7714 or the **American Indian & Alaska Native Health Boards List** (http://www.cdc.gov/omh/Populations/AIAN/AIANHB.htm)

Below are institutions that gather information on health. Much of this information is grouped from across the country, but some may be available on a local level.

MedlinePlus® (http://www.nlm.nih.gov/medlineplus) Website of the National Library of Medicine, National Institutes of Health lists the many government sources of information on Health. Includes sections on environmental health and the health of particular groups of people (children, elders, women, men, minorities).

Centers for Disease Control (http://www.cdc.gov/) The Centers for Disease Control (CDC), collects statistics and provides information on a wide variety of health topics. Their National Center for Environmental Health addresses diseases or deaths that result from interactions between people and their environment (http://www.cdc.gov/nceh) The CDC's Agency for Toxic Substances and Disease Registries (ATSDR) provides information about toxic exposures (http://www.atsdr.cdc.gov). Their Office of Minority Health collects statistics and reports on health disparities (http://www.cdc.gov/omh).

Indian Health Service (IHS) (http://www.ihs.gov) Offers statistics on Indian health and provides environmental health trainings. The IHS Environmental Health Support Center sponsors training courses on a variety of environmental health subjects.

A very useful website is http://www.LeadSafeHomes.info, by the U.S. Department of Housing and Urban Development (HUD). The site contains information on childhood lead poisoning by neighborhood and reports on inspections, violations, and deleading for specific homes. Currently the site has pilot maps and information for Boston, Chicago, and Baltimore and provides general guidance for addressing lead poisoning. For more information contact the National Center for Healthy Housing (410-992-0712).

HOW TO INTERPRET HEALTH DATA

This portion of the tutorial will explain how to use the health data you collected from the sources just described to answer the question, "Is my community experiencing more illness than it should?" This is not an easy question to answer. It involves looking at specific illnesses and whether they occur more often than they do in other communities. Review this section if you want to learn more about how to understand and/or calculate community health statistics; if not skip ahead to the summary of this section.

Often you can request to receive data from health departments which has already been analyzed for you. If you only have raw data (the total number of cases of a disease, but not the ratio of this number to state or national rates of the disease) you may need to do the comparison yourself. An example of how to do your own calculations is outlined later in this section.

RATES OF DISEASE

If there are ten cases of leukemia in your town, is this "too many?" Obviously, it is too many for the individuals with the disease and their families. However, just knowing the absolute number of cases of leukemia is not enough; the answer to "Is it too many?" will be different for a town of 15,000 and a town of 150,000. We need to frame the question in terms of the rate of the disease.

The rate is the number of cases in a defined time period divided by the population from which the cases arose during that same time period.

For example, if 175 cases of cancer were diagnosed in a town of 50,000 in one year, then the rate of cancer for that year is 175/50,000. Rates of disease are often presented in terms of number of cases per 100,000 people, so that the rate of 175/50,000 is equal to 350/100,000.

$$\frac{175 \text{ cases}}{50{,}000 \text{ population}} \times 2 = \frac{350}{100{,}000}$$

The rate just described is an incidence rate. A mortality rate differs from an incidence rate in that it is the number of persons who have died of a disease (in a specific time period and area), as opposed to those diagnosed with the disease, which is divided by the population. In the rest of this section, we will describe how to analyze incidence data. However, the same methods apply to mortality data.

There is a third type of rate called a prevalence rate. The prevalence rate for a disease is the number of people in an area who have the disease at any one point in time. If you know that 20 people in your town have cancer but you do not know when they were

diagnosed, then you know the cancer prevalence rather than the incidence. It is very difficult to compare your community to other communities using prevalence rates.

CATEGORY-SPECIFIC RATES

The incidence rate of cancer described above is a crude rate. It is the total cases of disease divided by the total population. Crude rates are not useful for answering your question, “Are people in my town sicker than in other towns?” This is because rates of disease vary by age, sex, and race.

We can also look at rates of disease for specific categories of the population — for example, for men and women separately, for black and white populations separately, or for specific age categories. These are called category specific rates. The population characteristics of your community may also be used to calculate what is called an adjusted rate, which is another way to account for the age, sex, and racial differences of your community versus other communities.

COMPARING RATES TO OTHER COMMUNITIES

Let us say you have gotten the disease rates that account for different age, sex, and race groups in your community. The next step is to answer the question: Is the rate of this disease high, or would it be considered normal?

Whenever you ask the question, “Is this normal?” you must ask, “Compared to what?” We need to compare the rates of disease in our area to those experienced by a normal population. Usually this normal or standard comparison population is the population of the United States or of your state. We use standard rates of disease from the US or state population to compute the number of cases we would expect to see in our town if residents were contracting the disease at the same rate as the comparison population.

When your community is compared to standard state or national rates, Standardized Incidence Ratios (SIR) or Standardized Mortality Ratios (SMR) are used.

The SIR (Standardized Incidence Ratio) is the ratio of how many cases there actually are (called the observed) in our area, divided by the number of cases we would expect in a population of that size based on the standard rates (called the expected).

SIR:

$$\frac{\text{Cases OBSERVED}}{\text{Cases EXPECTED}}$$

The SMR (Standardized Mortality Ratio) is the same ratio, constructed in the same way, but using mortality data instead of incidence data.

Let's think about what it means to compare observed to expected numbers in a ratio. If we observe the same number of cases that we expect, then our ratio of observed to expected (O/E) is equal to one. The SIR or SMR is usually expressed as this ratio multiplied by 100. The SIR in this example would, therefore, be equal to 100 with rates in the community the same as in other areas:

Observed	Expected	O/E	X 100	=	SIR
4	4	1			100

If we observe fewer cases than we expect, then the ratio of observed to expected is less than one, and the SIR or SMR is less than 100:

Observed	Expected	O/E	x100	=	SMR
2	4	0.5			50

This SMR of 50 means we see one-half the cases we expect.

If we observe more cases than we expect, then the ratio of observed to expected is more than one, and the SIR or SMR is more than 100:

Observed	Expected	O/E	x100	=	SMR
6	4	1.5			150

This SMR of 150 means we see one and one-half times the cases we expected.

In Woburn during the years 1969 to 1979, we see an elevated SIR for leukemia in males in all age categories, and for females aged ten to 14. Woburn's leukemia experience was even more striking when we look at where the leukemia cases lived. Six of the 12 cases lived in one census tract! For children aged one to 14 in this census tract, the SIR was 750 (seven and one half times the expected).

The point here is to illustrate that these rates can be calculated for any geographic area for which there are appropriate population figures and case numbers. Often, looking at smaller areas within a city or town can highlight problems that a whole-town analysis might miss.

Take a good look at the SIRs or SMRs for your community. If the ratios are hovering around one hundred, then there is probably not a problem with increased cancer in your town (at least for the years for which you have data). If your ratio is greater than one hundred, there could be a problem.

How much greater than 100 must a ratio be to indicate that there is a problem?

Here we must introduce the concept of statistical significance. The incidence of disease fluctuates randomly. That is, in an area with no health problem, if you expect 100 cases of disease, you will probably see anywhere from 90 to 110. You will not always see exactly 100, just as when you roll dice six times you will not always get the same results.

That is why, when a SIR or a SMR is greater than 100 (or less than 100), people might say that it is just due to chance; it is not statistically significant. This is often the case in community studies because the population tends to be small.

There are statistical methods to evaluate how likely it is that an SIR or SMR is due to a chance fluctuation. Whether a rate that seems high is due to chance depends upon the size of your population, and how high or low your results are. A discussion of these types of calculations is beyond this tutorial, but can be found in health statistics textbooks.

HOW TO ANALYZE RAW HEALTH DATA COLLECTED FOR YOUR COMMUNITY

If you are not able to get already analyzed data from a health agency, you can do your own calculations of the health rates and ratios for your community using raw data. An example of how to do this analysis follows. Read on if you want to learn about how to calculate community health statistics; if not skip ahead to the section summary.

To illustrate a health statistic analysis, we will calculate rates of leukemia in Woburn. Our source for the data in this example is an article titled "Childhood Leukemia in Woburn, Massachusetts" by Cutler et al., published in Public Health Reports, March-April 1986, Vol. 101(2), pp. 201-205.

DATA NEEDED FOR YOUR CALCULATION

Now we will run through an example of how to examine whether rates of disease in your community are higher than those in other areas. Leukemia rates in Woburn will be used as an example. We will first need the following data so that we can construct an SIR or SMR:

1. The number of cases of disease (or deaths) for each age and sex category in the community.
2. Population figures for the different age and sex categories in your community.
3. Standard rates for the disease for the same age, sex, and race categories.

SOURCES OF POPULATION DATA

We have already discussed how to get incidence or mortality data for your community. Where do you get population data for your community? The basic source for population data is the United States Census of Population, conducted every ten years. Data are available on town populations by census tract, age, sex, and race.

Census data are available at all Federal Depository Libraries. Call your local library to find the location of the Federal Depository Library nearest to you. You can also request data directly from the Bureau of the Census, 301-457-4100, (http://www.census.gov)

In addition, every state has a state data center which keeps census and other data. These offices will sometimes calculate mid-decade updates of population. You should always try to find the population figures from a time period that matches, as closely as possible, the time period for which you have your incidence or mortality data.

SOURCES OF STANDARD RATES

We use standard rates of disease from the U.S. or state population in our calculations to compare the number of cases in our study area to rates observed, in general, across the nation or the state. There are several sources of standard rates for cancer mortality and for cancer incidence. For cancer incidence, the main sources of data are:

- Your state cancer registry: Request age-, sex- and race-specific rates for the whole state.

- National Cancer Institute (NCI) Surveys: The NCI has conducted several large cancer incidence surveys in selected areas of the country. The first two surveys were done during the 1930s and 1940s. Since 1973, the SEER Program (Surveillance, Epidemiology, and End Results) has coordinated several cancer registries that continuously gather information on cancer incidence and mortality. The SEER registries cover more than ten percent of the U.S. population. A summary of their incidence and mortality data is titled SEER Cancer Statistics Review. This report is available in any medical school library.

In the Woburn example, we will use rates from the Third National Cancer Survey, 1969-71.

For mortality data, try these sources:

- Your state office of vital records probably publishes an annual report on causes of death in the state, which will include cancer. It might not break down cancer into the specific types in which you are interested. In this case, you may need to make a special request for these data.

- The SEER Program provides mortality data in addition to incidence data.

The important thing is to use incidence or mortality rates that are broken down by age, sex, and, if necessary, race. You must use specific rates. Sometimes you will come across "age-adjusted" rates; these are not category-specific and therefore are not suitable for constructing SIRs or SMRs.

You need to find rates that are broken down into the same age categories, by the same disease classifications, and for as close as possible to the same time period as the data on your town. This is a tall order, and, in fact, it often happens that you must estimate your data to match the available standard rates.

For example, if you want to examine cancer in children ages zero to ten, but data are available only for the age category 0-15, then you must settle for 0-15. If you need race-specific data, but cannot find appropriate standard rates, you will have to use what is available, realizing that your findings may reflect this imprecision. Unfortunately, this problem frequently arises due to the fact that environmental hazards are more commonly found in minority communities.

A SAMPLE CALCULATION

Now that we have the data we need, let's run through the calculations using the Woburn leukemia example.

First, set up a table like the one shown on the next page for males and females. If you were including race, then you would set up more tables (for example, black male, black female, white male, white female).

	1	2	3	4	5	6
		Standard				
Age	Population	Rate	Observed	Expected	O/E	SIR

First fill in the columns for which you have the data: columns 1, 2, and 3. You will calculate columns 4, 5, and 6:

COLUMN 1: Woburn population for each age category from the 1970 census

COLUMN 2: Standard rates for the incidence of childhood leukemia in Massachusetts for these age groups during the period from 1969 to 1979. From the SEER registries of cancer incidence described later.

COLUMN 3: The number of cases per age group of childhood leukemia diagnosed in Woburn during the period from 1969 to 1979. Obtained from a cancer registry.

MALES

	1	2	3	4	5	6
		Standard				
Age	Population	Rate	Observed	Expected	O/E	SIR
<5	1784	.0008	4			
5-9	2057	.0004	3			
10-14	2128	.0003	2			

The next step is to calculate the expected number of cases. This is easy. For each age and sex category, simply multiply the population (column one) by the standard rate (column two). The result is the number of cases we would have expected to occur in our study area, given its population, if the rate of disease was the same as state or national standard rates. For boys under five in Woburn, the expected number is:

1784 X .0008 = 1.4

It is not necessary to have whole numbers, although of course your "observed" will be whole numbers.

Let us fill in the whole table:

MALES

	1	2	3	4	5	6
		Standard				
Age	Population	Rate	Observed	Expected	O/E	SIR
<5	1784	.0008	4	1.4		
5-9	2057	.0004	3	.8		
10-14	2128	.0003	2	.6		

What remains to be done is to compare the observed and expected rates in a ratio. This is performed in column five and is simply the observed (column three) divided by the expected (column four):

MALES

	1	2	3	4	5	6
		Standard				
Age	Population	Rate	Observed	Expected	O/E	SIR
<5	1784	.0008	4	1.4	2.9	
5-9	2057	.0004	3	.8	3.8	
10-14	2128	.0003	2	.6	3.3	

The SIR or SMR is usually expressed as the ratio of the observed divided by the expected multiplied by 100, so multiply column five by 100 to get the SIR in column six:

MALES

	1	2	3	4	5	6
		Standard				
Age	Population	Rate	Observed	Expected	O/E	SIR
<5	1784	.0008	4	1.4	2.9	290
5-9	2057	.0004	3	.8	3.8	380
10-14	2128	.0003	2	.6	3.3	330

Now proceed to do this same calculation for each age, sex, and race category in your investigation. For females in Woburn:

FEMALES

	1	2	3	4	5	6
		Standard				
Age	Population	Rate	Observed	Expected	O/E	SIR
<5	1714	.0007	0	1.2	-	-
5-9	1982	.0004	0	.8	-	-
10-14	2083	.0002	3	.4	7.5	750

We have completed our calculations. Now we have ratios (SIRs or SMRs) that compare illness in our community to that in other areas. What we still do not know, however, is whether the differences we see are likely to be due to chance fluctuations. There are statistical methods to evaluate how likely it is that an SIR or SMR is due to a chance fluctuation. It will depend upon the size of your population, and how high or low your results are.

One method is to calculate whether the finding passes tests for statistical significance. Another method is to calculate a range around the SIR or SMR that reflects how confident one is of the finding. For example, if a study found an SIR of 150 and notes a "95% confidence interval" of 90-210, it means that we can be 95% certain that the "true" SIR would fall within this range given chance fluctuations.

An explanation of these types of calculations is beyond this tutorial, yet can be found in health statistics textbooks. We suggest Basic Epidemiology, by Beaglehole, Bonita, Kjellstrom, (World Health Organization, 1993) or Introduction to Modern Epidemiology by Ahlbom and Norell (Epidemiology Resources Inc., 1990).

ASSESSING HEALTH STATUS: SECTION SUMMARY

Routinely collected health data include birth and death records, chronic disease reporting, and cancer incidence data. Birth records are useful if you are concerned about low birth weight or birth defects, but your department of health might have to do this analysis since birth certificates are confidential. Cancer incidence data are useful if you suspect that cancer rates are too high in your town. Their limitations are:

1. The data has only recently begun to be collected and may not go back many years. This may limit the trends for which you can look.

2. Good health statistics for your population may not have been collected or could be hard to find.

3. Confidentiality restrictions may limit your access to the data.

Mortality data might overcome these problems. However, mortality data have their own set of problems, including incorrect or difficult to interpret cause of death on the death certificate. Also, keep in mind that if an environmental factor was endangering health in the community, mortality rates would only show an increase many, many years later after the exposures have occurred. Mortality data are therefore not a good tool for quickly identifying and responding to an environmental health concern.

Chronic disease statistics are often available for many other relevant health outcomes, such as asthma, lead poisoning and other respiratory and neurological problems. The sources of these data will vary from state to state; check first with your state's vital statistics office.

These various types of health statistics available for your community can help you answer the question we posed at the beginning, "Is my community experiencing more illness than it should?" Rates of disease for your community, alone, ***cannot*** answer the question, "Is a particular industry or waste site causing excess disease?" Rates themselves say nothing about cause. They are useful to flag a problem and to point to areas for further study that could help identify possible causes.

So, if you do find that a problem such as leukemia, asthma, or lead poisoning is high in your community, it may often be hard to answer precisely the question of what is causing the increase. You need to consider the various ways your community can reduce known risk factors for the disease and can provide appropriate care for affected individuals. This would include preventing pollution, helping people make their homes and lifestyles safer, and making sure they get good access to health services.

In the final chapter of this tutorial, we look at actions you can take to protect community health and the environment.

TAKING ACTION: STRATEGIES FOR PROTECTION

Once you have uncovered information on health and environmental concerns in your town, there are a number of options available for action. Let us consider some of the steps taken by residents to protect health and the environment in their communities.

HEALTH STUDIES & MEDICAL SERVICES

First, the residents of Woburn and surrounding neighborhoods formed an advocacy group, For A Cleaner Environment (FACE). Then, they obtained the help of researchers from a nearby university. Together they gathered information showing high rates of childhood leukemia which appeared to be related to contaminated well water. FACE then prompted Federal and State Agencies to verify these findings, and to undertake further health studies to discover:

- whether other health problems were occurring; and
- whether other sources of contamination in the town were affecting health.

To ensure that citizen concerns were fully addressed, FACE set up an advisory committee of residents and volunteer experts to oversee the ongoing health study.

Depending upon the type of health and exposure problems in your town, you may want to try to obtain health services which provide residents with:

- Screening for exposures to hazardous materials;
- Evaluation of health problems;
- Advice on follow-up care; and
- Ongoing health monitoring.

Public health agencies, while not required to set up this type of screening, have provided such services in several communities. Woburn residents worked to obtain health counseling services to address health problems in their city.

It is important to realize that while studies can generate useful information, they can take several years, are expensive, and rarely provide clear, definitive answers. While health problems were found to be linked to the environment in Woburn, this is not possible in most communities. Usually, not enough information is available about people's exposure to toxic chemicals. Not all chemicals can be measured in humans. People frequently move in and out of the community. Since health problems may take years to develop, affected persons may no longer be in the area, and unexposed newcomers may be present.

What all communities can do is create a profile to uncover possible sources of environmental contamination. They can then act to address those that are most serious, regardless of any known links to health problems. Community action can ensure our children inherit a clean, safe, and healthy environment.

CLEANING HAZARDOUS SITES

Many of Woburn's contaminated sites have now been placed on state and federal lists to be investigated and remediated (contained or cleaned up, if possible). FACE formed citizen advisory committees to oversee the process at the two large federal Superfund sites in Woburn. They have also taken advantage of EPA money which is available to citizen groups for hiring a technical advisor. The purpose of a technical advisor is to help citizens participate in the remediation process at federal Superfund sites.

In addition to working with State and Federal agencies, citizens have negotiated directly with industries, the city and other parties which they feel bear responsibility for cleaning up Woburn.

If your community has a federal Superfund site, you may qualify for an EPA Technical Assistance Grant. Contact the regional EPA Superfund Office for your state. Ask for a free copy of the Superfund Technical Assistance Grant Handbook. It will contain the necessary application forms, sample applications, and information about the grant.

To address Department of Defense sites, residents can join Restoration Advisory Boards. As with Superfund sites, there may also be Technical Assistance funds to help hire a technical advisor. As an example, the Native Alaskan residents of Saint Lawrence Island, AK have worked very hard over many years to get hazardous waste sites on the Island cleaned up. They approached many federal agencies until they succeeded in getting the sites listed for cleanup by the Department of Defense. Community members wanted to have input over how the cleanup would take place. They were persistent in their requests to the Department of Defense to form a Restoration Advisory Board (RAB). A RAB was formed in 2000, and residents joined to provide advice on how the site is cleaned up. The RAB successfully applied for a Technical Assistance for Public Participation grant, and hired a technical advisor. The community vigorously participates in the RAB and it has provided a useful forum to exchange information with agencies cleaning the site. When a new landfill to bury site wastes on the Island was proposed, residents successfully worked through the RAB to advocate for an alternative

solution. The community is also engaged in health research to help understand the nature and extent of contamination.

Smaller hazardous waste sites may be eligible for technical assistance grants from the state. Contact the department responsible for environmental protection in your state to find out whether these funds exist and what rights citizens have to participate in cleanup efforts.

POLLUTION PREVENTION

Woburn residents have viewed preventing new contamination as a particularly important focus for their efforts. A lesson from Woburn's health tragedy and multimillion dollar cleanup is that preventing pollution is vital to protecting health and the environment in a community, and is much more effective than trying to clean up past mistakes.

Among the pollution prevention efforts in Woburn, citizens arranged for a study of areas which drain into the current water supply, and worked to get the city to adopt new ordinances to restrict potentially harmful activities in these critical watershed areas. In addition, they have worked for passage of important new state and federal laws, such as the Massachusetts Toxics Use Reduction Act. They joined advisory committees of the State Department of Environmental Protection to provide input into their regulation of hazardous materials.

Town bylaws or city ordinances you can encourage to prevent pollution include:

- Laws regulating underground fuel storage tanks
- Zoning restrictions to control development
- Board of health regulations to protect water supplies and air quality
- Hazardous materials bylaws to reduce use of toxic materials in the community

The ability of a town to adopt regulations depends upon state law. In Central South Phoenix, Arizona, residents joined together to form the advocacy group Neighborhoods for Justice. Working with a local foundation, an area university, and environmental professionals willing to volunteer their time, they arranged for a study of environmental hazards in their community. They are working with the city to adopt new environmental justice ordinances that will make it more difficult to site new, potentially harmful activities in neighborhoods that have already been burdened by an unfair share of pollution. Neighborhoods for Justice makes sure that they are notified when proposals are made to the city and state environmental agency for new permits to release pollution so that they can comment on the proposal.

Pollution prevention can take many forms. Many cities are focusing on small businesses located near residents. Forming partnerships among businesses, government, and citizens is crucial to successful programs. Below are some more examples.

In Albuquerque, New Mexico, parents and community activists of La Mesa neighborhood are trying to improve their children's health. They have focused on improving the indoor environments where children spend most of their time. With assistance from specialists from environmental health nonprofits and agencies, they have walked through homes, schools, and daycare centers to identify opportunities to reduce harmful exposures.

In Lawrence, Massachusetts, Hispanic residents and small business owners are working together to improve their local environment. Hispanic-owned auto body and repair shops are getting technical and financial assistance to improve their management of hazardous materials. Auto body shops are working together to pool their resources. Residents are also training each other in environmental health. They have identified a range of concerns. These include the air pollution caused by waste incineration and traffic in the valley. They also have learned to improve children's health by reducing triggers for asthma and warning families to stop burning mercury in their homes as part of traditional religious ceremonies.

Efforts to reduce the use of toxics can be aided by industrial hygienists who inspect facilities and can recommend safer methods of production. Some states have established agencies to assist communities and industries. The Massachusetts Office of Technology Assistance and the Toxics Use Reduction Institute at the University of Massachusetts Lowell (http://www.turi.org) are examples. Ask your state environmental department if such services are available. Also, look to the expertise of university environmental offices and area nonprofit organizations.

The EPA funds varied nonprofit, community, and state initiatives to prevent pollution through several grant programs. These include the Environmental Justice Through Pollution Prevention Grants or the Sustainable Development Challenge Grants. Contact the **U.S. EPA's Pollution Prevention Information Clearinghouse** at (202) 260-1023 for more information about technical, policy, and grant information for companies and communities seeking to reduce use and production of hazardous materials. Those with access to the Internet can visit the **EPA Office of Pollution Prevention** home page for information and links to numerous other sites with discussions, resources, and model programs supporting pollution prevention (http://www.epa.gov/opptintr/p2home/).

For more information and sample ordinances contact:

Center for Health, Environment, and Justice
P.O. Box 6806
Falls Church, VA
(703) 237-2249
Website: http://www.chej.org

Native Americans Rights Fund
1506 Broadway
Boulder, CO 80302
303-447-8760
Website: http://www.narf.org/

For programs and materials on protecting critical water supplies, call the National Drinking Water Clearinghouse, West Virginia University (800) 624-8301 and the U.S. EPA Safe Drinking Water Hotline (800) 426-4791. You'll also find an interesting and valuable Internet website that includes watershed basin maps, indicators of pollution, and protection strategies, on the EPA's Surf Your Watershed site, available through the EPA: http://www.epa.gov/surf/.

EDUCATION

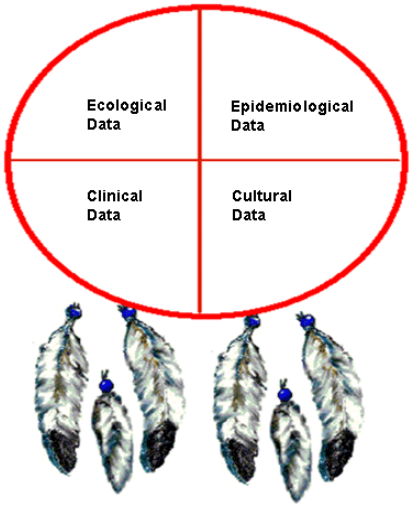
Educating others, whether they be residents, interested students and researchers, or citizens from other communities with similar problems, has been an important goal for Woburn activists. Newsletters, media statements, educational exhibits, Earth Day celebrations, high school environmental contests, conferences, and public hearings are some of the outreach efforts they have undertaken.

The pamphlet Poisons in MY Home?...You Bet! was prepared by FACE for residents and distributed in churches nationwide. It offers safe alternatives to household products which are hazardous. Contact JSI Center for Environmental Health Studies for a copy: JSI, 44 Farnsworth Street, Boston, MA 02210-1211.

The REEP (Roxbury Environmental Empowerment Project) is another exciting model of environmental education. Working with several inner city schools, REEP is getting students involved in reducing the high rates of asthma in their community by working on pollution prevention and environmental justice. Contact them through Alternatives for Community and Environment, 2181. Washington Street - Suite 301, Roxbury, MA (617) 442-3343

REEP youth hold an asthma and air quality fair.

The Salish and Kootenai College (SKC) is a tribal college whose nursing program integrated environmental health into its core curriculum. The program links a healthy environment with a culture that can promote the health of all people, stating as a goal: **"The vision must include the voice, the ideals, the knowledge and the cultural survival of Indigenous People."** Students apply what they learn in community field projects. They have helped improve drinking water, address lead poisoning, and identify pesticide exposures in their communities.



Environmental Health Medicine Wheel

Nursing students learn that a strong approach to environmental health includes information on the environment, health research, medical observations, and culture.

Developed by Lori Lambert, Assistant Director Distance Education, Salish and Kootenai College

Used by permission of the author.

For more information on environmental education materials contact the EPA's Information Resources Center at (202) 260-5922. The North American Association for Environmental Education can also be a valuable resource at (202) 884-8912. The North American Association for Environmental Education can also be a valuable resource at (202) 884-8912.

EMERGENCY PLANNING

Emergency planning has become an important responsibility for communities. Avoiding chemical emergencies is part of the planning process. The same law that requires industries to submit toxic release inventories (TRI) also requires states and localities to plan for potential chemical emergencies.

- Local Emergency Planning Committees (LEPCs) must be formed locally.
- State Emergency Response Commissions (SERCs) are required at the state level.

LEPCs and SERCs are sources of more detailed information about community hazards. They can inform you about the use, storage, and transportation of hazardous chemicals at specific facilities. They can also give you industry, locality, and state emergency plans. For more information and support a good resource is the LEPC/SERC Network established by the Unison Institute and the EPA available through the Internet at: http://www.rtknet.org/resources.php. Assistance is also available from the Emergency Planning and Community Right-to-Know Hotline: National Toll Free: (800) 424-9346 or in Washington DC Area: (703) 412-9810.

LEPCs are required to include a broad membership, including community and environmental groups, the media, emergency responders, business, and government representatives. Serving on these committees or simply attending meetings can be a way of having important input into the control and prevention of community hazards. The Woburn citizen group made sure that their LEPC conducted outreach to inform community residents about hazards in their communities and about facility emergency plans.

TAKING ACTION: SECTION SUMMARY

There are numerous strategies for protecting your community from toxic pollution. Even if your community is very small and has limited resources, you may be able to achieve important gains through networking with other local, state, or national environmental organizations.

Finding the answers you seek and promoting positive change requires a great deal of time and serious commitment. We all owe a debt to those who have worked hard to ensure a healthy environment in our communities. Be prepared for what may be a long road ahead. Active involvement, however, is the only way to protect our communities now and for the future.

You can make a difference -
Good luck in your efforts!

Appendix A
JSI Health & Environment Contact Guide

JSI Health and Environment Contact Guides
The JSI Center for Environmental Health Studies has compiled guides to provide ready starting points for individuals interested in investigating potential environmental sources of health problems in their communities. Health and Environment contact guides have been tailored for the following:

- General Public (http://www.jsi.com/Managed/Docs/Publications/EnviroHealth/HealthEnvironmentContactGuide_GeneralPublic.pdf)

- Native Americans (http://www.jsi.com/Managed/Docs/Publications/EnviroHealth/HealthEnvironmentContactGuide_NativeAmerican.pdf)

Appendix B
How to File a Freedom of Information Act (FOIA) Request

Gary Bass, of OMB Watch, and John Chelen, of Unison Institute, offer the following advice on filing a Freedom of Information Act (FOIA) Request:

Under the Freedom of Information Act (FOIA), you have the right to many government agency records (including government databases). There are three basic elements to a FOIA request letter:

- First, the letter should state that the request is being made under the Freedom of Information Act. The envelope containing the written request should be marked "Freedom of Information Act Request" in the bottom left-hand corner.
- Second, the request should identify the records that are being sought as specifically as possible.
- Third, the name and address of the requester must be included.

Several optional items are often included in a FOIA request:

- The telephone number of the requester. This permits the employee processing the request to talk to you if necessary.
- A limitation on the fees that you are willing to pay. Fees can add up so this is important. It is common for requesters to ask to be contacted if the charges will exceed a fixed amount.
- A request for a waiver or reduction of fees. Fees must be waived or reduced if disclosure of the information is in the public interest because it is likely to contribute significantly to public understanding of the operations or activities of the government and is not primarily in the commercial interest of the requester. Charges for these purposes are limited to reasonable standard charges for document publication and search. There should be no charge for the first two hours of search time and the first 100 pages of documents.

Each agency is required to determine within 10 working days whether to comply with the FOIA request. There is no deadline on the actual disclosure of the requested records. An agency may refuse to disclose an agency record that falls within any of FOIA's nine statutory exemptions. Two exemptions may directly affect access to environmental information:

- Information exempt under other laws. A statute may require that matters be withheld from the public in such a manner as to leave no discretion to the agency. For example, the Federal Insecticide, Fungicide, and Rodenticide Act prohibits disclosure of most information about the grower's use of pesticides and for the information that is collected, it allows for an exemption from FOIA.

- Confidential business information. A significant amount of information collected by EPA is considered trade secrets and confidential business information. Many of EPA's rules permit great leniency to the industry to classify information as a trade secret. The TRI is an exemption to the rule.

If you feel you have wrongfully been denied access to agency records or a fee waiver, or wish to contest the amount of fees being assessed, or believe the agency did not do an adequate job in searching for the documents you requested, you may appeal in administrative and judicial forums and courts. You may wish to seek assistance from a lawyer if you pursue this course of action.

Adapted from "Toxic Release Access and Use" by Gary D. Bass, OMB Watch, and John Chelen, Unison Institute, Washington, DC.

A sample letter is shown below.

Sample Freedom of Information Request Letter

** Reprinted with permission from OMB Watch and Unison Institute*

To: Agency Head (or FOIA Officer)
Name of Agency & Address

RE: Freedom of Information Request

Dear _____:

This is a request under the Freedom of Information Act. I request that a copy of the following documents [or documents containing the following information] be provided to me: [identify the documents or information as specifically as possible].

In order to help determine my status to assess fees, you should know that I am [insert a suitable description of the requester and the purpose of the request (e.g., an individual seeking information for personal use and not for a commercial use; affiliated with an educational or noncommercial scientific institution, and this request is made for a scholarly or scientific purpose and not for a commercial use)].

[Optional] I am willing to pay fees for this request up to a maximum of $. If you estimate that the fees will exceed this limit, please inform me first.

[Optional] I request a waiver of all fees for this request. Disclosure of the requested information to me is in the public interest because it is likely to contribute significantly to public understanding of the operations or activities of the government and is not primarily in my commercial interest. [Include a specific explanation].

Thank you for your consideration of this request.

Sincerely,
Include your address & telephone number]

Table 3: 2002 Release Summary from Woburn, MA Toxic Release Inventory

Chemical Name	Released or Transferred to:	Total Release (in Pounds)
METHANOL	Offsite	99
	Sewerage System	8
	Air	19,693
LEAD COMPOUNDS	Offsite	12,707
	Air	1.24
	Land	0.1
	Sewerage System	0.2
THIOUREA	Not Available	Not Available
AMMONIA	Air	273
	Sewerage System	255
	Offsite	1,843
BENZO(G,H,I)PERYLENE	Not Reported	None Reported
POLYCYCLIC AROMATIC COMPOUNDS	Not Reported	None Reported
METHYL ETHYL KETONE	Air	2,860
	Offsite	110,812
EHHYL ACETATE MIXTURE	Air	2,000
	Offsite	12,189
N-HEXANE	Air	2,000
	Offsite	29
TOLUENE	Air	1,860
	Offsite	40,834
GLYCOL ETHERS	Air	910
	Sewerage System	5
	Offsite	7,471
N-METHYL-2-PYRROLIDONE	Air	5,911
	Sewerage System	5
	Offsite	12,158
SULFURIC ACID	Air	151
	Sewerage System	5
	Offsite	50
DIISOCYANATES	Air	61
	Offsite	5,221
Total Releases to the Environment		**16,126**
Total Transfers Offsite		**223,286**

Source: RTKNET (http://www.rtknet.org, click on resources) based on data from U.S. Environmental Protection Agency 2004.

Table 3: 2002 Release Summary from Woburn, MA Toxic Release Inventory

Chemical Name	Known or Suspected Health Effects:	Hazard Ranking
METHANOL	Child development, respiratory	Low - Moderate
LEAD COMPOUNDS	Cancer, heart, respiratory and other	High
THIOUREA	Cancer, child development, heart and other	Moderate - High
AMMONIA	Reproduction, respiratory, damage to nervous system skin, and liver	
POLYCYCLIC AROMATIC COMPOUNDS	Cancer, reproduction, Heart, liver, and other	High
METHYL ETHYL KETONE	Child development, Heart, liver and other	Low – Moderate
EHHYL ACETATE MIXTURE	Not Available	Not Available
N-HEXANE	Child development Respiratory, reproductive, Nervous system, other	Low – Moderate
TOLUENE	Child development Respiratory, reproductive, Nervous system, other	Low – Moderate
GLYCOL ETHERS	Child development Respiratory, reproductive, Nervous system, other	Low – Moderate
N-METHYL-2-PYRROLIDONE	Child development Kidney, heart, Nervous system, other	Low
SULFURIC ACID	Muscles, respiratory, skin	Moderate – High
DIISOCYANATES	Respiratory	Not available
Total Releases to the Environment		**16,126**
Total Transfers Offsite		**223,286**

Chemical Name	Total Release or Transfer (in Pounds)
METHANOL	19,800
LEAD COMPOUNDS	12,708
THIOUREA	No Amount Given
AMMONIA	2,371
BENZO(G,H,I)PERYLENE	No Amount Given
POLYCYCLIC AROMATIC COMPOUNDS	No Amount Given
METHYL ETHYL KETONE	113,672
EHHYL ACETATE MIXTURE	14,189
N-HEXANE	2,029
TOLUENE	42,694
GLYCOL ETHERS	8,386
N-METHYL-2-PYRROLIDONE	18,074
SULFURIC ACID	206
DIISOCYANATES	5282
Total Releases to the Environment	**16,126**
Total Transfers Offsite	**223,286**

Source: RTKNET (http://www.rtknet.org, click on resources) based on data from U.S. Environmental Protection Agency 2004.