

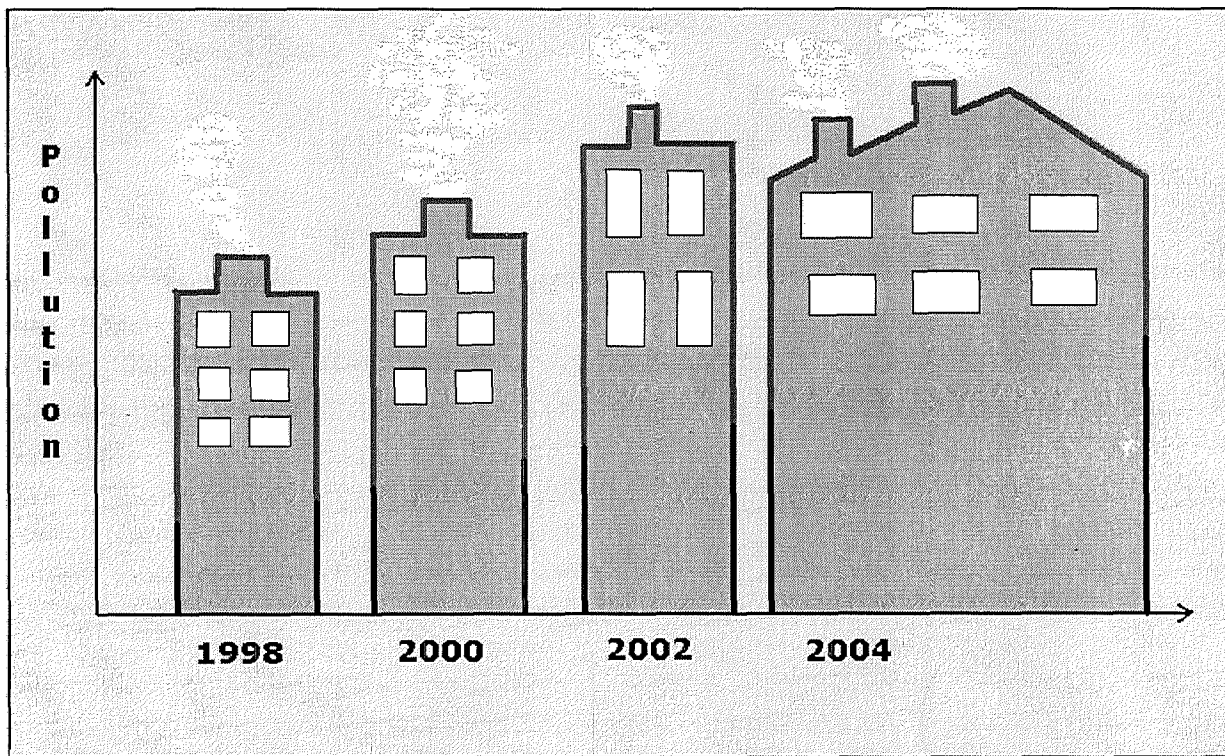
CANADIAN INSTITUTE FOR
ENVIRONMENTAL LAW AND POLICY

L'INSTITUT CANADIEN DU
DROIT ET DE LA POLITIQUE
DE L'ENVIRONNEMENT

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Environmental Law and Policy
Teachers' Guide To The National Pollutant Release
Inventory

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TEACHERS' GUIDE TO THE NATIONAL POLLUTANT RELEASE INVENTORY



Canadian Institute for Environmental Law and Policy

January 2005

Prepared for PollutionWatch
(<http://www.PollutionWatch.org>)

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I Introduction

Pollutant Release and Transfer Registers (PRTRs) are tools that allow governments to track and manage information on pollution, as well as provide pollution information to the public. The data reported to PRTRs can be collected from point sources, such as stacks of facilities, or non-point sources, such as agricultural operations. PRTRs typically include information about releases to air, water and land as well as waste transported to disposal sites. Pollutant registers inform citizens about pollution and enable them to participate in environmental decision-making. PRTRs also allow operators of industrial facilities to assess their performance, and enable decision-makers to make informed decisions. In addition, PRTRs provide valuable information to other sectors of society, including scientists, law and policy makers, and insurance companies.

The main requirements for successful pollutant registers are:

- Pollution releases and transfer data reporting by facilities is mandatory;
- Data is updated regularly (usually annually);
- Reporting covers releases to all environmental media, that is, air, water and land; and transfers for disposal or recycling; and,
- Public access to information on a facility and pollutant basis.

The purpose of this *Teachers' Guide to the National Pollutant Release Inventory* is to help junior high and high school teachers understand what information they can find in the inventory, how and where to access the data and how to use it in the classroom. This guide also contains classroom activity examples based on NPRI data found on PollutionWatch - an interactive web site where visitors can find out what chemicals are released in their local communities. These activities will help students to learn more about the chemicals released into local watersheds and airsheds.

II Pollutant Release and Transfer Registers (PRTRs) in different jurisdictions

In 1987, the United States (US) became the first jurisdiction to introduce a Pollutant Release and Transfer Register, followed by Canada, the Netherlands, the United Kingdom, Australia and other countries. Although many countries around the world operate pollution inventories, the policies tend to differ. For example, the list of substances that require reporting and their associated reporting thresholds can vary from country to country.

The European Commission and the European Environmental Agency are also harmonizing their industrial emissions to air and water reporting, and developing a comprehensive European Pollutant Release and Transfer Register (PRTR). This register will provide annual information on more than 90 substances released to air, water and land, and will cover 65 industrial activities. It will also include information from non-point sources such as road traffic, aviation, shipping and agriculture. The new register should go online in 2009.¹

The Commission for Environmental Cooperation (CEC), an organization created as an associated environmental agency designed to work with the North American Free Trade

¹ The European Pollutant Emissions Register web site and background information can be found at <http://www.eper.cec.eu.int>

Agreement (NAFTA), compiles data and publishes *Taking Stock*, an annual report on the North American Pollutant Inventories. The report on 2001 data includes 21,254 industrial facilities as well as electrical utilities, hazardous waste management facilities, wholesale chemical distributors and coal mining, and all categories of releases and transfers. Over 11% of all releases of chemicals in North America are known or suspected carcinogens.²

Canadian environmental organisations analyse the National Pollutant Release Inventory (NPRI) data to inform citizens about pollution in their communities. The Canadian Environmental Law Association and Environmental Defence provide a unique Internet service on the PollutionWatch web site (<http://www.PollutionWatch.org>). By simply entering their postal code, visitors to the site can find out who is polluting in their community, the type and quantity of pollution being released and the potential health risks.

III Canadian National Pollutant Release Inventory

Canada's National Pollutant Release Inventory is an annual, publicly accessible database of pollutants released on site to the environment or transferred off site for disposal or recycling by private and publicly owned facilities.

The NPRI was developed in 1992 through a multi-stakeholder process that used the US experience as a model. Nine representatives from different industrial sectors – six environmental and labour groups, and three federal and provincial governments – formed the Advisory Committee to make recommendations for the first Canadian NPRI. Public involvement in the NPRI development arose from a community's right to know exactly what toxic chemicals are being produced, used or manufactured in its neighbourhoods.

NPRI is a dynamic program. Since the first reporting of pollution releases and transfers in 1994, there have been many changes in the NPRI. The most important changes were:

- Additional substances have been added or deleted;
- The reporting thresholds for specific substances have been amended including the addition of criteria air contaminants for 2002; and,
- Requirements for reporting for different industries have changed.

PollutionWatch Web site
<http://www.PollutionWatch.org>

You can also access the NPRI data on the PollutionWatch web site, a joint web site project of the Canadian Environmental Law Association and Environmental Defence. PollutionWatch allows you to review and analyze the NPRI data by using several tools.

PollutionWatch
<http://www.PollutionWatch.org>

² For more information and to download an electronic version of the annual *Taking Stock* report visit North American Commission for Environmental Cooperation web site <http://www.cec.org>

On PollutionWatch you can:

- Create a timeline of pollution trends (the timeline is visually represented on a colour-coded graph);
- Determine the total amount of pollutants released to air, water or land;
- Search by postal code by entering the first three digits of your postal code to find facilities reporting releases and transfers of pollutants in your community;
- Access graphs, tables and facility profiles. The facility profile page provides information on the list of pollutants released and transferred. This page also provides the name and address of the facility;
- Send a letter to the facility using the link "Email/Fax Facility" on the facility profile page or send a letter to the Federal Minister of Environment by linking to the "Take Action" button located on the main menu bar;
- Determine the location of the facility using the "Location Map" function; and,
- Find out how many people work in the facility and where the owner of the company is located using the "Facility Information" link found on the facility profile page.

IV Understanding NPRI

Legal basis of the NPRI

The National Pollutant Release Inventory is a key source of information about pollution in Canada. The *Canadian Environmental Protection Act* (CEPA), which was renewed in 1999 and went into force in April 2000, requires the federal government to have a "national inventory of releases of pollutants" and requires Environment Canada "to publish the national inventory of releases of pollutants". If owners and operators of facilities meet the reporting criteria determined by the Minister of the Environment, they are required by CEPA to report to the NPRI. (More information on environmental regulation is available on the PollutionWatch web site under Environmental Laws <http://www.PollutionWatch.org>).

The owner or operator of a facility reports to NPRI if the facility meets all three of the following criteria:

Employee Criteria: The facility has 10 or more full-time employees (or an equivalent of 20,000 worker-hours per year).

Facility Criteria: The facility manufactured, processed or otherwise used 10 tonnes or more of an NPRI substance during the calendar year.

Concentration Threshold: The NPRI substance was manufactured, processed or otherwise used at a concentration of 1% or more by weight.

Who reports to NPRI?

The NPRI includes more than 100 industrial and commercial sectors. In 2002, the most current publicly available data, 4,596 facilities reported to this registry. On occasion, even if a facility uses chemicals, it might be too small to report to the NPRI and information about this facility may not be available on the NPRI.

Some sectors, which otherwise meet the criteria listed above, are exempt from reporting to the NPRI. These include universities, schools, research organizations, retail, mining (extraction activities are exempt) or dental practices.

Some facilities are required to report despite the reporting criteria. For example the employee threshold does not apply to waste incinerators, wood preservation operations or wastewater collection systems discharging more than 10,000m³ of wastewater per day. That means that even if employees in these facilities work in total less than 20,000 hours per year, these facilities are still required to report their releases to NPRI, usually because they release small amounts of highly toxic pollutants harmful to human health, such as dioxins and furans. More information concerning reporting requirements is available at <http://www.PollutionWatch.org> in Understanding the Data.

What does a facility have to report to the NPRI?

Every year each facility that meets the reporting requirements for the substance listed under NPRI must report its releases and transfers for that substance. If a facility meets the criteria (employee, facility and concentration) but actually has not released or transferred any NPRI substances, it reports 0.0³ kg released (see page 6 of this guide).

The PollutionWatch web site presents NPRI data using the terms *releases* and *transfers*:

On-site Releases: A release at the site of the facility, within the boundaries of the facility, using one of the following methods:

- **Air release:** A release of a chemical into the air at the facility site;
- **Water release:** A release of a chemical into the water, usually a stream, lake or ocean. Included in this category are direct discharges, spills and leaks;
- **Land release:** A release of a chemical onto the land at the facility site. Included in this category are landfills, land treatment (a chemical is applied onto or incorporated into soil), spills, leaks and other land releases; and,
- **Underground Injection:** A release of a chemical injected into the ground at the facility site.

According to the Ontario Clean Air Alliance report on mercury emissions, five coal-fired power plants operated by Ontario Power Generation emitted 527 kilograms of mercury to the air in 2002.

In recent years, Environment Canada has recognized the need for NPRI to clarify the picture it provides of persistent bioaccumulative and/or toxic substances, such as mercury. In 2000, Environment Canada introduced special NPRI reporting requirements for mercury. The reporting threshold for mercury and its compounds was lowered from 10,000 kilograms to five kilograms and the 1% concentration threshold was eliminated. Certain types of facilities, such as incinerators, cement kilns and wastewater treatment plants, which are sources of mercury, were required to report regardless of their number of employees.

The results of lowering the mercury-reporting threshold were dramatic: The number of facilities reporting mercury and its compounds jumped from 18 facilities in 1999 to almost 300 facilities in 2000. The amounts of mercury and its compounds reported increased 350%.

The report called Mercury Rising: Mercury Emissions from Ontario Power Generation's Coal Fired Plants can be found at:
<http://www.cleanair.web.net/resource/mercurv.pdf>

³ A value "0.0" means that the level of a specific pollutant does not meet the reporting requirements.

Off-Site Releases: A release of chemicals, generally transferred from the facility to another location for disposal using one of the following methods:

- **Containment:** Either landfill or other storage at an off-site location;
- **Land treatment:** Either land application or land farming at an off-site location; and,
- **Underground injection:** Chemicals injected underground at an off-site location.

Transfers for Further Management: Chemicals transferred off the facility site to another facility for the following:

Treatments:

- **Physical Treatment:** Includes methods such as drying, evaporation and other;
- **Chemical Treatment:** Includes methods such as precipitation, stabilization or neutralization; and,
- **Biological Treatment:** Includes methods such as bio-oxidation or composting.








Incineration: Chemicals transferred to an incinerator. This differs from energy recovery as the substance or the material containing the substance does not have sufficient fuel value to contribute toward energy recovery.

Sewage: Chemicals discharged to a sewer system or a waste water treatment facility.

Energy recovery: The substance or the material containing the substance has sufficient energy content to be used as a fuel for energy recovery.

Transfers for recycling: Chemicals sent off-site for recycling.

Steps required by a facility reporting to NPRI 2002:

-  Facility produces and releases chemicals
-  Facility determines by itself if it is required to report to NPRI
-  Facility estimates releases and transfers by itself and collects all the information required by NPRI
-  Facility writes NPRI report
-  Facility sends the NPRI report on releases and transfers to Environment Canada by June of the each reporting year
-  Environment Canada collects and analyzes the information
-  Environment Canada releases the data to the public (<http://www.ec.gc.ca/pdb/npri/>)

What substances are reported?

NPRI is a dynamic registry and NPRI reporting requirements may change from year to year. The 2002 NPRI data is the most current publicly available data. For the 2002 reporting year,

NPRI listed 274 substances for mandatory reporting. The list of substances reported can be obtained from the Environment Canada NPRI web site http://www.ec.gc.ca/pdb/npri/npri_si_e.cfm In 2002, 4,596 facilities reported to NPRI. This represents an increase of 1,979 facilities from the previous reporting year and is due to significant changes in reporting requirements.

The federal government, in consultation with stakeholders including non-governmental organizations and industries, expanded the list of substances that must be reported to the NPRI for the year 2002 to include chemicals known as Criteria Air Contaminants (CACs). These include carbon monoxide, oxides of nitrogen, particulate matter less than or equal to 2.5 microns (PM 2.5), particulate matter less than or equal to 10 microns (PM 10), particulate matter less than 100 microns (total particulate matter), sulphur dioxide, and volatile organic compounds (VOCs). These pollutants are key smog- and acid rain-causing chemicals. (For more information about criteria air contaminants and their environmental and health effects, visit <http://www.PollutionWatch.org>).

V How to use NPRI?

Environment Canada Communication Tools: web, disks, reports

NPRI data can be accessed using a wide range of tools:

- Download or order NPRI Annual reports and fact sheets;
- Download the NPRI database and analyze it by yourself (warning: the Excel database takes 19,641KB of memory);
- Order a CD with the database from NPRI office; and,
- Search the database on the NPRI web site. You can search by facility or by location.

National Pollutant Release Inventory
web site
<http://www.ec.gc.ca/pdb/npri/>

Other search functions and tools available on PollutionWatch:

Pollution Rankings

This search allows web site users to rank releases and transfers from facilities and companies across Canada. Visitors can choose a national view, or look for pollution in any province. They can also rank by health effects, such as carcinogens, respiratory toxins, endocrine disrupters, toxic substances, reproductive toxins and more.

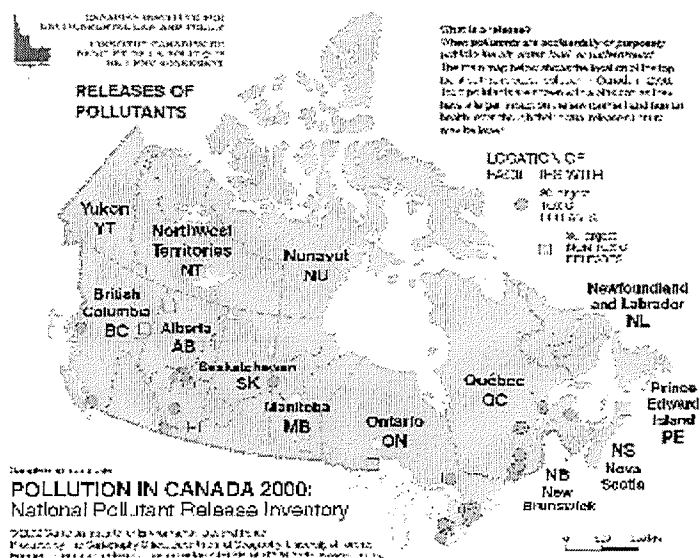
Who is Polluting?

With this search function, users can find out who is polluting (facility, company, sector). They can also choose to search by different types of air pollution – by Criteria Air Contaminants (CACs), which cause smog and acid rain, by toxic pollutants or by a combined total of both CACs and toxic pollutants. More generally, visitors or users can search by on-site pollution releases (air releases, water releases or land releases) as well as off-site releases (underground or off site land releases). (Definitions of the on-site and off-site releases are provided on the page 7 of this guide).

If you are interested in releases or transfers of a particular pollutant, go to the Select a Pollutant line for a full list of NPRI pollutants.

NPRI poster maps

The Canadian Institute for Environmental Law and Policy released poster maps showing pollution hotspots throughout Canada in 2000, 1998 and 1996 based on NPRI data from the corresponding year. NPRI maps are available in English and French.



The latest poster map, using data from the 2000 NPRI, presents the top on-site releases and off-site transfers of pollutants by facilities across Canada. The poster also shows a summary of releases, transfers and recycling of pollutants by province.

The poster is designed to familiarize students with the NPRI and to provide a useful teaching tool for Canadian and World Studies. CIELAP offers copies of the poster to teachers, researchers and environmental organizations. (To order the maps go to <http://www.cielap.org>).

VI Data interpretation

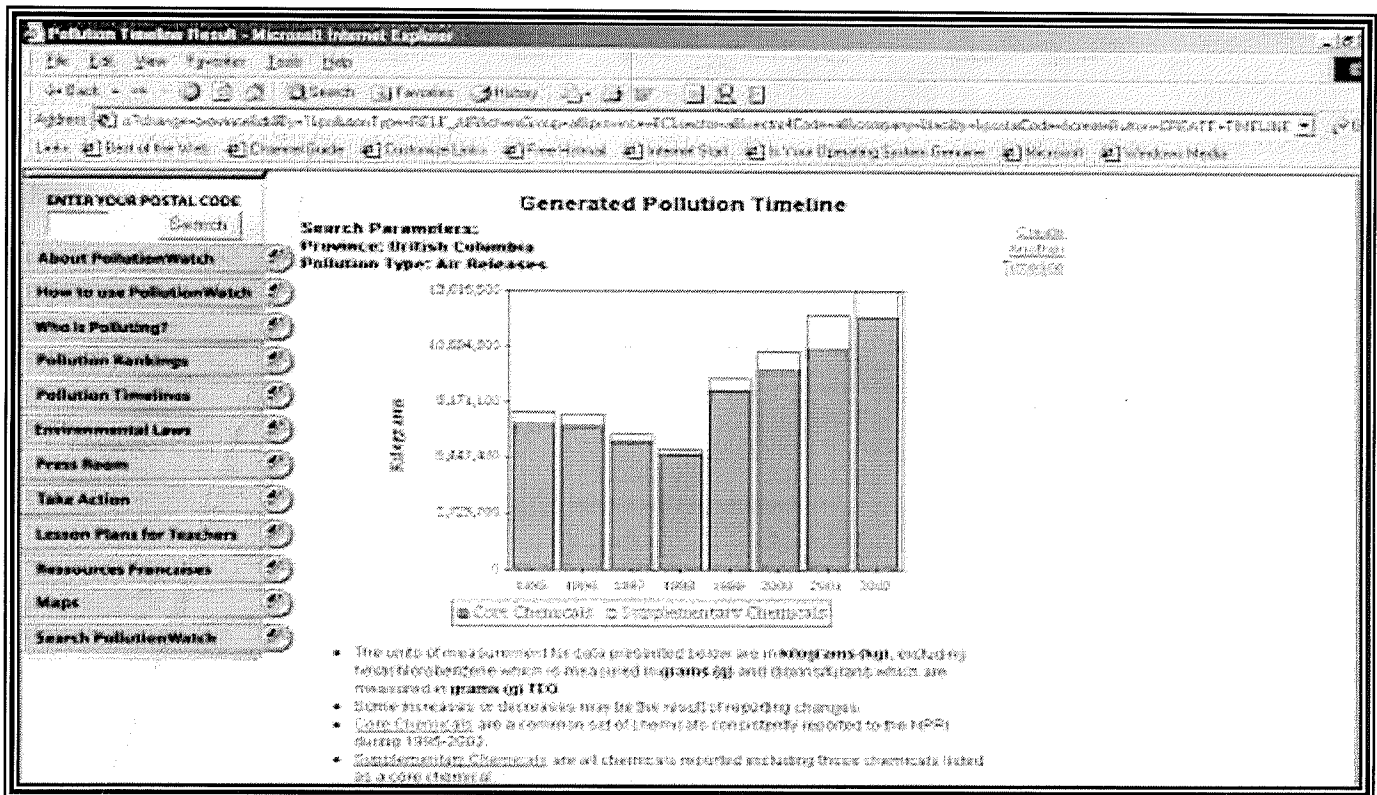
There are several ways governments, non-governmental environmental organizations, students and interested citizens use the NPRI data. Whether using the government NPRI web site or the PollutionWatch web site, carefully read the background information on how to interpret the NPRI data.

Year to year comparisons

One of the purposes of NPRI is to allow users to assess the pollution-release activities of a facility over time. The PollutionWatch web site will give you already calculated information on the amounts of substances released or transferred from year to year. You can find year-to-year release and transfer comparisons for individual facilities, provinces or territories or the whole country. (Generated Pollution Timeline, see Figure 1 below.)

When looking at changes to NPRI data over time, it is important to keep in mind that the amount of releases reported to the NPRI may change over time for a variety of reasons. In addition to changes to the actual amount of releases, these reasons may include changes to the methodologies used to calculate releases, changes to reporting requirements that result in reporting from new facilities and on new substances, and efforts to ensure that facilities are interpreting the NPRI requirements correctly. Therefore, an increase in releases reported to the NPRI does not necessarily correspond to an increase in actual releases to the environment.

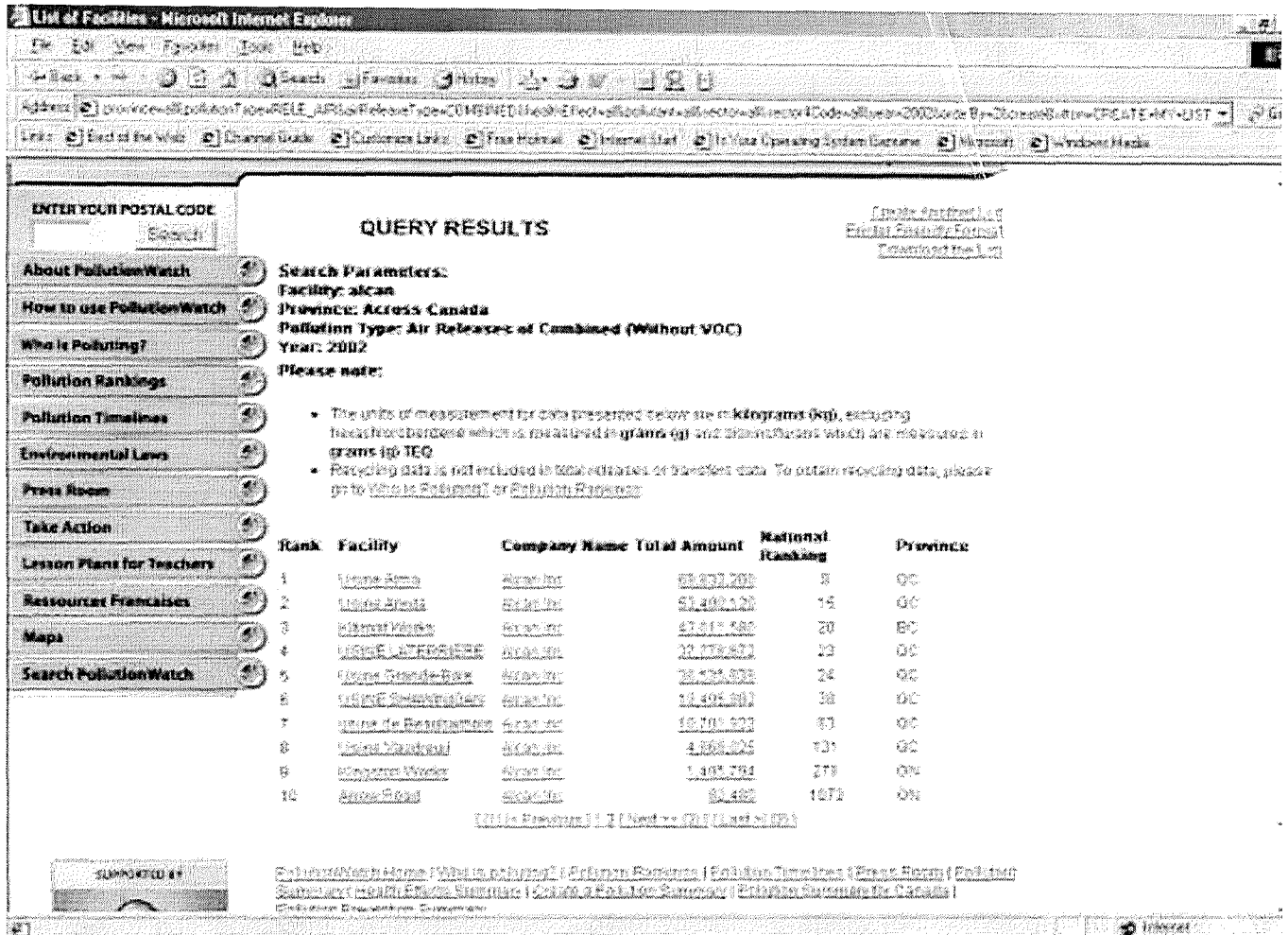
Figure 1: The graph shows a Generated Pollution Timeline of releases to air in British Columbia for the NPRI data from 1995 to 2002.



Facility-to-facility comparisons

If you would like to find out where the facility in your community ranks in comparison to similar facilities in the province or country, you can use facility-to-facility comparison. The PollutionWatch web site offers a Pollution Rankings tool that is easy to navigate. The facility-to-facility comparison could give you support for approaching your local facility and suggesting it take measures to cut releases to your environment. (See Figure 2 on next page for facility-to-facility comparison example.)

Figure 2: The example shows Query Results for Alcan Inc., a company producing metal. The facilities are ranked by air releases of CACs and toxic pollutants combined.



VII Other Sources of Pollution Data Information

Greenhouse Gas Inventory

On December 17, 2002, Canada ratified the Kyoto Protocol to the United Nations Framework Convention on Climate Change (UNFCCC). This Protocol binds Canada to a reduction of its greenhouse gas (GHG) emissions to 6% below 1990 levels. Under the Protocol, Canada's GHG Inventory will be the tool for measuring progress against this obligation. In 2004 the Government of Canada, in partnership with the provincial and territorial governments, launched the first phase of a mandatory greenhouse gas reporting system. By June 2005, facilities that have emissions greater than 100 kilotonnes of carbon dioxide equivalent in 2004 must report these emissions to the government.⁴ This would include major industrial facilities that produce electricity, heat or steam using fossil fuels certain power generation facilities, for example, as well as integrated steel mills, facilities involved in smelting and refining metals, petroleum refineries, and chemical

⁴ More information on Canada's GHG Inventory is available on the Environment Canada web site: http://www.ec.gc.ca/pdb/ghg/ghg_home_e.cfm

producers. The reporting system will help to track and publish GHG emissions and Canada's performance addressing climate change.

US Scorecard (<http://www.scorecard.org>)

The US based Scorecard web site contains a lot of comprehensive information on US Environmental Protection Agency's Toxics Release Inventory. This web site, which is designed and maintained by the US non-governmental organization Environmental Defense, also provides detailed chemical profiles and up to date health effects information.⁵

VIII How to Use NPRI Data in the Classroom

To find out about reported pollution in your community's water, air, or land it is necessary to first define the scope of your search. Below we suggest using a watershed or an airshed as a unit to narrow your search. (The description of airshed and watershed is provided in the following section of this guide.) When students perform the following activities, they must be made aware that NPRI data covers pollution only from point sources and does not include non-point source pollutants such as agriculture or transportation vehicles.

The following activities are recommended for students in grades six to nine.

Watershed and Airshed

A *watershed* is an area of land in which all rain and snow runoff and small tributaries drain into a common body of water such as a creek or lake. A sub watershed is an area drained by an individual tributary to the main watercourse.

A watershed-based management approach takes into account everything that occurs within a watershed, including both naturally occurring activities and human activities. In this regard, soil, vegetation, animals and humans are all an integral part of a watershed. Watershed-based management considers local as well as regional issues and is rooted in an ecosystem approach to management that uses the watershed as a water quality and quantity planning unit. It results in a better understanding of water quality and quantity and aquatic ecosystem problems and makes it possible to identify sustainable solutions. Watershed-based management also makes it easier to define action priorities by considering the cumulative impacts on aquatic ecosystems.

Different provinces have different authorities for their watershed management. For example, the Saskatchewan Watershed Authority is responsible for the management of local water quality and quantity and has posted maps of Saskatchewan watersheds on the Internet. (see <http://www.swa.ca> and go to maps). Other provinces, such as Ontario, also divided their areas into watersheds. Conservation Authorities in Ontario are responsible for watershed management in this province. (More, nicely illustrated information on watershed and threats for water sources can be found in the *Source Water Protection Primer* available on the Pollution Probe web site <http://www.pollutionprobe.org/Reports/swpprimer.pdf>)

Over the last two decades, there has been increased public awareness about issues such as urban smog, acid rain and global warming. The quality of the air we breathe is dependent on the rate that pollutants are emitted into the atmosphere and the ability of the atmosphere to disperse

⁵ U.S. EPA Toxics Release Inventory: Community Right-to-Know Homepage <http://www.epa.gov/tri/>

these pollutants. The movement and dispersion of air pollutants is controlled by wind, temperature, turbulence and the changes in these elements caused by local topography (mountains and valleys). An *airshed* has no fixed boundaries because seasonal variations and disruptive events, such as major storms, will cause an airshed's size and shape to change throughout the year.

Airsheds and watersheds are very closely related. For example, scientists in United States estimated that in the Chesapeake Bay area, 75% of nitrogen was deposited from the airshed to the watershed. The best example of an airshed is a valley surrounded by mountains where air does not change very quickly. Very few communities have such a clear boundary for their airshed. For the classroom activities, it is possible to use an airshed that is the same size as a watershed to define air pollution in your area.

The use of the watershed or airshed boundaries in the activities below will help students to visualize toxic releases on the map and demonstrate that toxic pollutants can have impacts far away from the source of release.

Activity Examples: Identify local watershed and find out about pollution using NPRI data through the PollutionWatch web site

Each of the following activities can be used on its own or in any combination with other activities that supports classroom curriculum. Activities are recommended for high school students but can be adopted for younger grades.

Activity 1

Time required: 4-5 time units (45 minute periods)

How to find pollution in your watershed?

This activity is designed so that students will be able to visualize the density of facilities releasing pollutants to their surrounding environment.

This exercise will allow students to identify key pollutants that are being released into the local watershed. Also, students will learn to clearly define a watershed. During this activity, students will research their own community or region. Students will perform searches on the Internet using the PollutionWatch web site for relevant information that pertains to their area of research.

Goals of this Activity:

1. To identify key pollutants that are being released into the local watershed;
2. To visually segregate key areas of concern with high pollutant values;
3. To visually see various pollutant release locations on a map;
4. To show students the boundaries which extend outside of their daily commuting lives;
5. To learn to identify watersheds.
6. To improve understanding of some of the health effects from pollutants found in a watershed.

Definition: Watershed

- A region in which a river or body of water receives its supply of water;

- A separator of high land which divides two land masses which drain into different river systems;
- A segregation or basin within which there is a common drainage system. This basin may be part of much larger drainage system; and,
- A water supply which functions for various daily consumption activities such as for human drinking, cleaning, manufacturing, farming and other.

Preparation Work for Teachers:

- Review the components that make up a watershed;
- Research local industrial regions and their pollutants which are being released in the watershed area;
- If you find there is a limited amount of information or data for your local watershed, choose a bigger river basin that is located nearby. For example, Northern Regions may have completely different water issues than those in the South with highly populated and industrialized cities; and,
- It would be useful to obtain a map with postal codes. Canada Post postal code maps are available at <http://www.postescanada.ca/cpc2/addrm/hh/current/index/tpALL-e.asp>. From this site you can get detailed maps of all the postal codes for your area of interest.

Step 1

Have students browse the web to research various pollutants in their environment. Have them gather and share information in groups and form a hypothesis on what pollutants they believe are affecting their environment and how they think the pollutants got there. (20 min)

Step 2

Have the class put together its idea of what a watershed is. First, define what a watershed is. Provide maps as examples. (20 min)

Step 3

Either in groups or as a class, identify a watershed that you plan to study, preferably one close to the students' everyday life. (20 min)

Students may wish to work in groups and approach local authorities responsible for the watershed management to acquire additional information about their local watershed.

Step 4

Create a large topographical map of your local area, region, or province. Students may wish to be assigned a certain watershed to examine industries located in each watershed. (20 min)

Step 5

Students will research all of the components of the watershed, such as who and what drains into the area and where the inlets and outlets are. Students will then receive a piece of transparent acetate that they will cut to fit the area of their watershed on the map. (40 min)

Step 6

Students need to place the transparent acetate on the map with postal codes to see what postal codes fall within the area of their watershed. Ask students to make a list of postal codes covered by the acetate. Entering each postal code in the PollutionWatch "search by postal code" function will let students find the list of facilities releasing pollutants to water. (See below the example of query results.) (40 min)

Step 7

Use stickers and push pins to mark the location of the facility if the releases to water are more than 0. (20 min)

Step 8

Bring the class together. Have them step back and study the map. Review the completed maps and identify possible areas of concern. Have the class identify the various watersheds, the clusters of pollutants, and have a discussion about why these clusters are where they are, and what could be done to reduce pollutant releases into the environment. (20 min)

Example (see Figure 3):

- Enter first two digits of Sarnia N7 that you found out from the Canada Post web site. You will get QUERY RESULTS with the list of 26 facilities.
- Click on the **Total Amount** of chemicals released by each facility. You will get a Facility Profile.
- On the facility profile page, click onto the total amount of releases for the facility or click on the **Pollution Ranking** located in right top corner on the screen. Scroll down to see **Water Releases**.
- Look for the releases to water for each facility.

Figure 3: This figure shows the query results for the postal code starting with N7. Users can click on the name of the facility or total amount to get more information.

ENTER YOUR POSTAL CODE

QUERY RESULTS

Search Parameters:
 Postal Code: n7
 Province: Across Canada
 Pollution Type: Total Reported Releases and Transfers
 Year: 2002

Please note:
 • The units of measurement for data presented below are in kilograms (kg), excluding hexachlorobenzene which is measured in grams (g) and dioxin/furans which are measured in grams (g) TEQ.
 • Recycling data is not included in total releases or transfers data. To obtain recycling data, please go to [Who is Polluting?](#) or [Pollution Rankings](#).

Rank	Facility	Company Name	Total Amount	National Ranking	Province
1	Sarnia Refinery Plant	Imperial Oil	31,395,712	29	ON
2	Cantor Canada Ltd.	Cantor Canada Ltd.	5,288,658	74	ON
3	Sarnia Refinery	Essex Energy Inc.	3,371,120	100	ON
4	Sarnia Chemical Plant	Tenneco Chemicals	3,200,054	126	ON
5	Sarnia Plant	Ethyl Industries Inc.	2,286,426	216	ON
6	Essex Inc. Sarnia Site	Essex Inc.	2,218,128	248	ON
7	Chatham	Commercial Alcohols Inc.	1,798,758	314	ON
8	Water Site	Monsie Chemical Corporation	1,598,278	341	ON
9	Sarnia Chemical Plant	Tenneco Ltd.	1,588,216	388	ON
10	Sarnia Production Plant	SE Canada Enso Chemicals	714,480	400	ON

Activity 2

Time required: 2-3 time units (45 minute periods)

Time trends and Facility-to-Facility Comparison

The purpose of this activity is to allow students to learn about releases and/or transfers of some specific chemicals, observe changes over time and compare to other similar facilities.

Goals of This Activity:

1. Identify 10 facilities in your province that release a specific pollutant;
2. Analyze records and determine which facilities have the greatest amount of pollutants released; and,
3. Analyze changes over time in releases to the media identified above in Activity 1.

Preparation Work for Teachers:

- Research local industrial facilities that release pollutants to the environment. You may use a larger area if the area where you live is not heavily industrialized.
- Look at the time trends on PollutionWatch and select those facilities that had the most dramatic changes in their releases.
- Research pollution prevention methods for industry (to be used in Step 6).

Step 1

Give students the name of a specific pollutant and tell them about its impact to the environment and human health. (This information could be gathered from the PollutionWatch web site.)
(15 min)

Step 2

Ask students to use the PollutionWatch web site to identify which facilities release this pollutant in your province. (15 min)

Step 3

Ask students to use PollutionWatch to identify media into which the selected pollutant is released.
(15 min)

Step 4

Ask students to select five facilities with the largest releases of the specific pollutant and make a table displaying the releases/transfers. (30 min)

Facility	1995	1996	1997	1998	1999	2000	2001	2002
1.								
2.								
3.								
4.								
5.								
Total								
Average								

Step 5

To visualize changes over time, ask students to make a graph for releases and describe any trends evident in the graph. (30 min)

Step 6

Identify the facility with the sharpest increase in releases. Compare it to the facility with the largest release in 2002. Ask students to think of reasons why releases from a facility might change from year to year. Discuss with students ways that a facility could decrease releases. (This information could be gathered from CIELAP's *Citizens' Guide to Pollution Prevention* or web sites on pollution prevention.) (30 min)

Conclusion

We hope you have found the *Teachers' Guide to the National Pollutant Release Inventory* interesting and trust you will find it useful. We would like to hear how you used the Guide and we welcome any advice you can provide. Your suggestions will assist us in the publication of future Guides for Teachers who wish to explore the importance of environmental protection on our health and on our society, as we all strive to live more sustainable lives.

About CIELAP

The Canadian Institute for Environmental Law and Policy (CIELAP) is a non-profit organization dedicated to providing leadership in the research and development of environmental law and policy that promotes the public interest and sustainability. CIELAP's vision is a world in which basic human rights include a safe and healthy environment, achieved through respect for, and preservation of, nature's integrity and diversity. Our work is focused on environmental issues related to water and air quality, pollution prevention, hazardous waste, food and biotechnology, and energy. To find out more about CIELAP or to access all our publications, visit our web site: www.cielap.org

Resources Available

CIELAP has numerous publications related to the topics discussed in this Teachers' Guide. To learn more about Hazardous Waste or Pollution Prevention, visit CIELAP's web site or contact us directly.

NPRI Education Tools:

- Canadian Pollutant Releases and Transfers NPRI data 2000 – Poster Map (senior)
- Canadian Pollutant Releases and Transfers NPRI data 2000 – Poster Map (junior)
- Citizens' Guide to National Pollutant Release Inventory

Hazardous Waste:

- Ontario: Open for Toxics
- Fact Sheet on Hazardous Waste (available only in hard copy)

Pollution Prevention:

- Citizens' Guide to Pollution Prevention (second edition due out in March 2005)