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Series on Pollutant Release and Transfer Registers No. 7

USES OF POLLUTANT RELEASE AND TRANSFER REGISTER DATA AND TOOLS FOR THEIR PRESENTATION

A Reference Manual

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OECD Environment, Health and Safety Publications

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IOMC

INTER-ORGANIZATION PROGRAMME FOR THE SOUND MANAGEMENT OF CHEMICALS

A cooperative agreement among UNEP, ILO, FAO, WHO, UNIDO, UNITAR and OECD

Environment Directorate
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Environment, Health and Safety Publications on Pollutant Release and Transfer Registers

Pollutant Release and Transfer Registers (PRTRs): A Tool for Environmental Policy and Sustainable Development. Guidance Manual for Governments (OECD/GD(96)32) (1996).

PRTR Series No. 1: Proceedings of the OECD International Conference on Pollutant Release and Transfer Registers (PRTRs). PRTRs: National and Global Responsibility. Tokyo, 9-11 September 1998. Part 1 (1999).

PRTR Series No. 2: Proceedings of the OECD International Conference on Pollutant Release and Transfer Registers (PRTRs). PRTRs: National and Global Responsibility. Tokyo, 9-11 September 1998. Part 2 (1999).

PRTR Series No. 3: Presentation and Dissemination of PRTR Data: Practices and Experiences, Getting the Word and Numbers Out (2000).

PRTR Series No. 4: How Pollutant Release and Transfer Registers Differ: A Review of National Programmes (2001)

PRTR Series No. 5: Resource Compendium of PRTR Release Estimation Techniques, Part 1: Summary of Point Source Techniques (2002)

PRTR Series No. 6: Resource Compendium of PRTR Release Estimation Techniques, Part 2: Summary of Diffuse Source Techniques (2003)

PRTR Series No. 7: Uses of Pollutant Release and Transfer Register Data and Tools for Their Presentation: A Reference Manual (2005)

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This publication was produced within the framework of the Inter-Organisation Programme for the Sound Management of Chemicals (IOMC).

The Inter-Organisation Programme for the Sound Management of Chemicals (IOMC) was established in 1995 following recommendations made by the 1992 UN Conference on Environment and Development to strengthen co-operation and increase international co-ordination in the field of chemical safety. The participating organisations are FAO, ILO, OECD, UNEP, UNIDO, UNITAR and WHO. The World Bank and UNDP are observers. The purpose of the IOMC is to promote co-ordination of the policies and activities pursued by the Participating Organisations, jointly or separately, to achieve the sound management of chemicals in relation to human health and the environment.

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FOREWORD

The OECD Task Force on PRTR Release Estimation Techniques was established in February 2000 under the auspices of the Joint Meeting of the Chemicals Committee and the Working Party on Chemicals, Pesticides and Biotechnology. The Task Force began work on the uses of PRTR data in 2000 by having conducted a scoping study on the "Uses of PRTR Data". It described current and evolving uses of PRTR data and identified the scope of the potential uses of PRTR data in environmental policy development.

It was supplemented shortly after by a scoping study on how the PRTR data can be used to help companies to meet their environmental requirements within the context of the environmental management systems.

These studies were commissioned under the auspices of the OECD Task Force on PRTR Release Estimation Techniques that was renamed in 2002 the Task Force on Pollutant Release and Transfer Registers. In the March 2003 meeting of the Task Force it became evident that the scoping study on the uses of PRTR data does not quite achieve the set target and will require further input from member countries. The United States volunteered to further develop the document.

The Task Force reviewed the paper again in November 2003. It was concluded that the paper gives a good overview of different uses and current practices in member countries and it is based on a survey carried out among member countries. However, the Task Force identified a possible overlap between the presented document and the paper addressing the use of PRTR data within the Environmental Management Systems (EMSs), and proposed to combine the two documents. The United States agreed to have a closer look into the EMS document and make sure that the core elements of that document are covered by the document on "Uses of PRTR Data and Tools for Their Presentation".

This document provides the final version of the "Uses of PRTR Data and Tools for Their Presentation", including the core elements of the EMS document. It was prepared at the US Environmental Protection Agency, TRI Program, under the supervision of Ms. Maria Doa and Mr. John Dombrowski.

This document is published on the responsibility of the Secretary-General of the OECD.

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LIST OF ACRONYMS

ARET	Accelerated Reduction and Elimination of Toxics (Canada)
BEEP	Biological and Ecological Effects Potential
CAP	Community Advisory Panel
CEC	Commission for Environmental Cooperation (North America)
CHEMS	Chemical Hazard Evaluation for Management Strategies (risk screening system)
CIELAP	Canadian Institute for Environmental Law and Policy
CPPI	Canadian Petroleum Products Institute
EHS	Environmental Health and Safety
EIRIS	Ethical Investment Research Service
EMS	Environmental Management System
EPA	Environmental Protection Agency
FoE	Friends of the Earth (UK)
GIR	Groupe Investissement Responsable (Canada)
GIS	Geographical Information System
GRI	Global Reporting Initiative
HTP	Human Toxicity Potential
IDEA	Integrated Data for Enforcement Analysis (U.S.)
ISO	International Standards Organization
NPI	National Pollution Inventory (PRTR data for Australia)
NPRI	National Pollutant Release Inventory (PRTR data for Canada)
NRTEE	National Roundtable on Economy and the Environment (Canada)
OCAA	Ontario Clean Air Alliance (Canada)
OECD	Organisation for Economic Co-operation and Development
OPG	Ontario Power Generation (Canada)
PI	Pollution Inventory (PRTR data for United Kingdom)
PIRG	Public Interest Research Group (U.S.)
PERI	Political Economy Research Institute
PROPER	Program for Pollution Control, Evaluation, and Rating (PRTR data for Indonesia)
PRTR	Pollutant Release and Transfer Register
PVC	Polyvinyl Chloride
RSEI	Risk-Screening Environmental Indicators (U.S.)
TAI	The Access Initiative
TCE	Trichloroethylene
TRI	Toxics Release Inventory (PRTR data for United States)
UK	United Kingdom
USEPA	United States Environmental Protection Agency

1. INTRODUCTION

The Organisation for Economic Co-operation and Development (OECD), comprised of 30 member countries,[*] adopted a recommendation in 1996 on Implementing Pollutant Release and Transfer Registers (PRTRs).[**] Since then, OECD has worked with governments, industry, and non-governmental organizations to develop practical tools that facilitate efforts by member countries, provide outreach to non-member countries, and coordinate international activities.

Specifically, to help member countries implement efficient and effective PRTR systems, OECD produces and disseminates documents describing the experiences of countries that have developed PRTRs, current and emerging uses of PRTR data and how PRTRs differ. Also, under development is an evaluation framework for release estimation techniques (RETs) that industry can use to select suitable RETs for the estimation and calculation of the releases and transfers of different pollutants.

This report presents numerous examples of the variety of tools for presenting and illustrating PRTR data and the types of uses of PRTR data in OECD member countries. It presents examples of uses for the purposes of the public, community groups, industry, the government, and academic and independent research institutions. The intent of this report is not to describe all of the many programmes, activities, and tools that use PRTR data, but to present examples in each category to illustrate the wide variety of current and evolving uses of such data.

[*] The member countries are Australia, Austria, Belgium, Canada, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Japan, Luxembourg, Mexico, Netherlands, New Zealand, Norway, Poland, Portugal, Republic of Korea, Slovak Republic, Spain, Sweden, Switzerland, Turkey, United Kingdom and United States.

[**] A PRTR is an environmental database or inventory of potentially harmful chemicals and/or pollutants released to the air, water and land, and transferred off-site for treatment. PRTR data contains releases and transfers of certain chemicals from certain sources. The basic idea of a PRTR is to provide a tool to be able to track chemicals and/or pollutants as they are being released into all media (land, air and water) or transferred off-site. According to the OECD Council Recommendation [C(96)41(final), as amended by [C(2003) 87], the core elements of a PRTR system are:

i) A listing of chemicals, groups of chemicals, and, if appropriate, other relevant categories all of which are pollutants when released or transferred;
ii) Integrated multi-media reporting of releases and transfers (air, water and land);
iii) Reporting of data by source where the reporting sources are defined;
iv) Reporting on a periodic basis, preferably annually; and
v) Making data available to the public.

2. TOOLS FOR PRTR DATA PRESENTATION

Several available tools provide assistance for effective use of PRTR data. These tools can be used as an aid to understanding PRTR data themselves, or may be used to integrate PRTR data as an input for broader analyses. They include data presentation tools, including geographic information system (GIS), toxicity weighting, normalization, risk screening and scoring, and environmental indicators that may help using PRTR data for assessing environmental performance more effectively.

A special meeting convened by the Commission for Environmental Cooperation (CEC) focused on tools developed in North America for assisting the use of PRTR data. The background paper for that meeting describes in more detail the tools discussed here.[1]

2.1 Presentation of the Mere PRTR Data

In their simplest form, PRTR data can be made available to the public as reported. Someone interested in a facility's report can request the data and receive a copy of the form as filled out by the facility. However, the usefulness of PRTR data is greatly expanded when the data from a number of facilities can be accessed and analyzed. Most governments that collect the PRTR data and make them available on the Internet do so through a data management system that allows an interested person to query or search the Internet data. Data management systems may provide the capability to search for a facility by name, by postal code, or by city or other jurisdictional boundary. The search results usually display the amounts reported by substance for each year. In addition, data management systems may provide the ability to search for a group of facilities or reports of interest, such as all reports for a particular chemical or all reports for a particular municipality or industry sector. The search capability allows for summarizing the data at several levels; it can also allow for ranking and mapping the summarized data.

Many community groups and other non-governmental organizations have developed tools to enhance the presentation and search capability of Internet data provided by environmental agencies. The enhanced tools include providing the entire database with additional search criteria (such as by parent company, industrial sector, substance, or type of release) or providing the ability to search by substances grouped by particular health effect. The community groups also publish reports using such summarized data, for example, for all power plants or the chemicals of concern for children's health or for facilities discharging into a local river. They may combine the PRTR data with recommendations for changes in regulations or in operations for particular facilities.

Ranking can be used to answer such questions as:

- Which facility reported the largest air emissions in my neighborhood?
- Which steel mills reported the largest transfers of zinc?
- Which facilities reported the largest releases of carcinogens?
- Which industries reported the largest reductions in releases?

Presentations of PRTR data may also attempt to place a facility's performance within an overall environmental context. For example, one facility's releases to air may be 50 percent of all air releases reported within a particular geographical area, or may be an insignificant contributor.

2.2 Ranking

A common tool used to analyze PRTR data is ranking. Facilities, cities, substances, industry sectors can all be ranked according to the amount of releases, for example. Often, ranking is used to display facilities within a particular locale or for a group of substances of concern.

For example, the PollutionWatch website (http://www.pollutionwatch.org/home.do) provides Canadian PRTR data on facilities.

It ranks their releases based on total kilograms for all substances reported or for groups of substances, including carcinogens, respiratory toxicants, reproductive and developmental toxicants, endocrine toxicants, and ozone depleting substances. The site presents these rankings of facilities within a province or a municipality.

2. 3 Geographic Information System

A geographic information system (GIS) is a tool designed to work with data based on jurisdictional or geographical coordinates. GIS is usually used to map PRTR facilities and to integrate PRTR data with other geographic information. However, systems that report data geographically, even if no mapping capability is available, are included in this report. For example, included are systems that retrieve data from a PRTR database by jurisdiction and display the reported amounts, often ranked from largest to smallest amount or ranked by a subset of chemicals (for example, carcinogens).

GIS mapping tools can vary from simple maps displaying the location of a facility in a jurisdiction (by postal code, for example) to maps that locate an individual facility along with institutions like schools or hospitals and environmental data, such as landfill sites, impaired water bodies, or air quality monitoring stations, to maps that present PRTR data along with demographic data. Mapping tools are often a primary means of making the PRTR data accessible to the public.

GIS can be used to answer such questions as:

- What facilities are in my neighborhood?
- How do the facilities in my neighborhood compare to facilities in other neighborhoods?
- Where are chemical plants, petroleum refineries, steel mills located?

There are several mapping tools that will display PRTR data along with other environmental or demographic data. One example is LandView, a computer desktop mapping system that can map jurisdictional boundaries, rivers and railroads, schools, airports, dams and other landmark features, sites regulated by the U.S. Environmental Protection Agency (USEPA), and demographic and economic data. The latest version with USEPA data, LandView 6 (see http://www.census.gov/geo/landview/), allows users to connect to online databases for the most up-to-date information for a particular mapsite. It also allows for the calculation of population within a specified radius of a particular site.

Another example is the MapCruzin.com website (see http://www.mapcruzin.com/tri_2000_maps), which provides maps for each U.S. state along with the U.S. Toxics Release Inventory (TRI) facilities located on the maps. The mapping software can show roads, cities, rivers, lakes, and jurisdictional boundaries.

GIS mapping tools have been extensively used in studies of environmental justice, which examine the geographic distribution of PRTR facilities and the correlation between these facilities and the residence of disadvantaged groups (e.g., low income groups, ethnic minorities).

2.4 Toxicity Weighting

Toxicity weighting is a process by which the amount of the substance released into the environment is adjusted or "weighted" by the predicted impact to human health and/or the environment. It offers an additional opportunity to evaluate releases based on relative toxicity of different substances. Even among chemicals that are generally considered toxic (are listed on PRTR substance lists), the toxicity can vary widely and the toxicity may depend on the medium of the release.[1] Usually, toxicity weighting involves multiplying the quantity of the substance released by a standardized toxicity "weight" for that substance. The releases weighted by toxicity are then aggregated and compared.

Toxicity weighting can be used to answer such questions as:

- Which discharges to the river may be causing the most harm to the ecosystem?
- Which industry sectors should be targeted for technical assistance or stricter regulations, based on their current impacts on human health and/or the environment?
- Which waste streams at a facility deserve priority attention to best protect human health and the environment?

Both the US TRI and the Canadian NPRI use toxicity weighting in their reports of dioxins and furans. The NPRI requires facilities to report the amount of dioxins and furans released in toxic equivalents. The sum of the toxic equivalent for 17 congeners of dioxins and furans is reported for each type of media release and transfer. While TRI facilities report the total grams for the 17 dioxin and furan congeners, the facility also reports the percentage of the total attributable to each congener, so that toxic equivalents may be applied.

An example of toxicity weights based on a human health multimedia fate and transport model is the Human Toxicity Potential (http://www.tev.ntnu.no/edgar.hertwich/HTP_ETC.html). These weights are used by Scorecard (http://www.scorecard.org/) in its ranking of facility releases. Substances are divided into carcinogenic and non-carcinogenic, and releases are weighted and summed by facility for a ranking within a geographic area.

A large number of toxicity weighting factors and methodologies exist. Choosing the most useful one for a given situation will depend on the available data, resources and, of course, the problem to be investigated. Several studies that compare toxicity weighting methodologies may help the analyst or decision-maker decide whether or not to apply toxicity weighting to PRTR data.

A World Bank report compared seven risk-weighted rankings under alternative measures of toxicity (such as short term versus long term exposure) as well as these rankings to unweighted

[1] **Toxicity:** Deleterious or adverse biological effects elicited by a chemical, physical, or biological agent.

Hazard Characterization: A description of the potential adverse health effects attributable to a specific environmental agent, the mechanisms by which agents exert their toxic effects, and the associated dose, route duration and timing exposure.

Note: In Europe the term "hazard" is used as an equivalent term for "toxicity".

rankings.[2] This report concluded that it is important for environmental regulators to engage in weighting pollutants for their relative toxicity when prioritizing pollution control efforts, either at the industrial or regional level. However, at high levels of aggregation such as the state or national level, the choice of a particular weighting scheme showed fewer significant differences and should not be a matter of extended debate.

Another study, undertaken at the University of California at Berkeley, has evaluated weighting schemes for potential use in research using the US TRI data.[3] The study found 13 weighting schemes that have been or could be used to weight TRI and other toxic release data. The schemes varied in complexity and realism from schemes that simply quantify a few types of risk (such as chronic exposure that may cause cancer, chronic exposure that may cause non-cancerous health effects, and acute exposure that may cause non-cancerous injuries) to models accounting for exposures to environmental media. The study found that schemes based on toxicity weights tied to workers or the numbers of regulations that govern a chemical are not well suited to weighting chemical releases to the environment. Analysts only interested in impacts to human health could use a scheme that uses toxicity weights based on human health impacts in conjunction with multimedia fate and transport models, while analysts interested in both human and environmental impacts should use a multimedia fate and transport model that incorporates ecosystem impacts. The report cautioned that analysts may wish to use multiple weighting schemes to determine the extent to which their results depend on which scheme is chosen; the report also noted that no scheme evaluated covered all of the TRI substances, a further reason for comparing results from different schemes.

2.5 Risk Screening

A risk-screening is designed to rank chemicals according to their potential impact on human health and/or environment. It can be used as a screen to identify priority areas for further investigation. This category of tools uses toxicity along with environmental fate and exposure potential to determine the likelihood that a chemical will harm human health or the environment. Thus, the PRTR data are combined not only with toxicity data, as described above for toxicity weighting schemes, but also with data on environmental fate (how long the chemical remains in the environment and what its distribution will be) and on potential exposure (how likely it is that a human, plant, or animal will come into contact with the chemical). Risk screening does not predict actual effects but can readily identify substances, facilities, or geographic areas of potential concern.

Risk screening can be used to answer such questions as:

- What release medium for a particular chemical poses the greatest potential for risk-related impacts?
- Which industry sectors in a region pose the greatest potential for risk-related impacts?
- What has been the reduction in risk-related impacts over the past years?

One risk screening system is the Chemical Hazard Evaluation for Management Strategies (CHEMS) model developed by the Center for Clean Products and Clean Technologies at the University of Tennessee under a cooperative agreement with USEPA (see http://www.aftresearch.org/researchresource/wp/sp98-1/ipmswan.htm). This screening tool provides a relative assessment of chemical hazards to human health and the environment. It combines measures of chemical toxicity with chemical releases (PRTR data) and information on environmental persistence and bioaccumulation.

Another example involving a USEPA tool, which can be used for risk screening in pollution prevention planning, is TRACI – the Tool for the Reduction and Assessment of Chemical and Other Environmental Impacts (see http://www.epa.gov/ORD/NRMRL/std/sab/download2.htm). This tool takes as inputs chemical emissions (PRTR data), energy, water, and fossil fuel use and estimates potential effects for such issues as ozone depletion, global warming, human toxicology, ecotoxicology, acidification, and eutrophication. Studies using the model can be conducted on existing products or processes and compared to alternatives in order to identify, for example, pollution prevention opportunities.

2.6 Normalization

Normalization in the context of PRTR data is a process of allocating pollutant releases on a standardized or "normalized" basis. The results of this type of analysis are presented in terms of quantity of pollutant released and transferred per unit of output. For example, the amount of releases and transfers can be stated in terms of kilograms per ton of product, sales dollars, population, land area, or other productivity or value measure. Normalization typically involves the division of amount of releases and transfers (e.g., kilograms) by the measure of industrial activity (e.g., tons of steel or dollars of sales). By expressing pollutant releases and transfers on a per unit of output basis, normalization attempts to account for varying activity over time or differences among facilities or locations. Normalization may be useful to individuals interested in environmental performance or "eco-efficiency" of a facility, company, or industry sector. Such data clarify the relationship between PRTR data and economic activity and identify the influence of external economic factors (such as production changes) to overall releases and transfers.

Normalization can be used to answer such questions as:

- Is one facility within the company able to generate less waste per unit of product than another?
- How do the facilities in my company compare to those of a competitor?
- Are release levels going down in spite of increased production levels?

Companies may use normalization to compare their facilities or processes or product lines. For example, Bridges to Sustainability (http://www.bridgestos.org/) has developed a series of metrics that normalize pollutant releases by product line, sales, and revenues to feed into a total cost assessment for both existing and proposed products within a company. The metrics are used to evaluate progress or technology options, to benchmark progress, and to evaluate suppliers.

Companies also use normalization to present comparative environmental performance over time that accounts for changes in production levels. For example, automobile companies may present their releases in kilograms per vehicle produced, electricity generating facilities may calculate kilograms per megawatt hour of electricity produced, and petroleum refiners give kilograms per barrel of oil refined. These metrics are presented for each year, and the changes may be compared to changes in operations at individual facilities or for a company as a whole.

2.7 Environmental Indicators

Environmental indicators are tools to measure and simplify complicated systems in order to communicate meaningful information about the performance and trends of systems. They indicate environmental performance and are generally used to track performance of a facility,

company or geographic region, or to compare the performance of different companies and industries.

Macroeconomic indicators are commonly used in the financial sector. For example, gross domestic product (GDP) has been used as the primary national measure to understand national economic performance in many countries. Such macroeconomic indicators measure monetary value of transactions, but does not measure other benefits such as those provided by clean air or protection from ultraviolet radiation. Environmental indicators are designed to supplement and to provide context for the macroeconomic indicators by tracking the additional factors of pollution prevention and reduction.

Environmental indicators can be used to:

- Report on environmental performance to the public;
- Strengthen accountability with the public;
- Provide the focus for improvement efforts;
- Set the framework for a systematic assessment of progress; and
- Guide policies and decision-making throughout an organization.

Within a facility or company, environmental indicators commonly track energy and water use and a waste intensity of production. The waste intensity indicator is often measured using PRTR data. For example, one measure of waste intensity quantifies the amount of material released to the environment, disposed of, or not considered an intended product from the manufacturing process. This is the material accounted for in a PRTR system. Waste intensity is calculated by dividing the amount of "waste" by the level of production. The level of production can be in terms of physical units (e.g., number of liters of paint, number of cars) or in dollars of sales.

While environmental indicators can be used for internal monitoring of a facility's performance, they are most often used as a means to communicate environmental performance to others in the community, or to investors. For this purpose environmental indicators are often found in corporate annual reports. They also provide a framework for national environmental policy evaluation and a basis for governmental State of Environment Reports.

In such reports, PRTR data can be used in one of several types of environmental indicators. For example, the trend in air or water releases of toxic chemicals is often used as an environmental indicator. The amount of waste disposed of per capita each year (i.e., a measure normalized by population) can facilitate comparisons between geographic regions but also provide trends from year to year. Absolute numbers from the PRTR register provide information on the size of impact or achievement, while PRTR data that are normalized allow for comparisons of similar products or processes and provide information on the efficiency of an activity or the intensity of an impact, or relate the performance or achievements of one company or region to another.

The development of a set of meaningful environmental indicators can be a difficult task. To be most effective the set of environmental indicators should be sensitive to environmental change, relevant to public policy and easily understood by a non-technical audience.

Many institutions are beginning to develop guidelines for developing the most appropriate environmental indicators and understanding their relationships to the changes noted. One example is the Global Reporting Initiative (GRI) (see http://www.globalreporting.org/). The GRI is an

international voluntary set of guidelines for reporting on economic, environmental, and social issues that aims to provide a global benchmark for sustainable development. It provides a broad general list of indicators and encourages reporting organizations to develop their own list appropriate to their economic, environmental, and social situation. Its purpose is to provide information about economic, environmental, and social impacts of the reporting organization that enhances comparisons of performance between reports and between reporting organizations.

The Canadian National Roundtable on Economy and the Environment (NRTEE) has developed a workbook for calculating eco-efficiency indicators to encourage companies in Canada and internationally to measure and report energy, waste, and water indicators on a consistent basis (see http://www.nrtee-trnee.ca/Publications/Eco-efficiency_Workbook/en/introduction.htm). The waste intensity measures make use of the Canadian NPRI data as an available methodology for calculating emissions to air and water. Further, the workbook suggests using the NPRI methodology for calculating emissions of substances not on the NPRI list.

Environment Australia has also developed a report that outlines a methodology for the voluntary presentation of information about an organization's environmental performance (see http://www.ea.gov.au/industry/finance/per/index.html). This "Public Environmental Reporting" workbook demonstrates how corporations can measure and report to the public on the management of environmental risks associated with their business operations. The public environmental reporting framework includes, among other data, measures of emissions to land, air, and water that can be obtained from PRTR data and specifies that such measures can be presented as absolute amounts and amounts per unit output. Further, the report discusses how the presentation of trends, accompanied by a discussion of programs, reduction targets, and progress toward these targets, will present a fuller picture of environmental performance for the corporation.

The Silicon Valley Environmental Partnership, an initiative to promote environmentally sound business and community practices, published its *Silicon Valley 1999 Environmental Index* as a tool for better understanding the quality of the environment and tracking changes over time.[4] The report contains 21 indicators to assess environmental trends, documents progress toward restoring a healthy natural environment, identifies priorities, and designs actions for environmental improvement. The *Index* describes where and how to get the data for each indicator.

State of Environment reports prepared by governments are common methods for communicating information on environmental conditions and trends to measure progress and inform public decision-making. These reports often present, among other data, PRTR data as summaries of trends in releases and transfers or waste generated. For example, the provincial government of British Columbia has developed a report incorporating a set of 16 environmental indicators to support its public decision-making processes (see http://wlapwww.gov.bc.ca/soerpt/soereporting.html). The report aims to provide a comprehensive analysis of environmental conditions and trends. Among the environmental indicators is a comparison of on-site toxic substances released by facilities located in the Province of British Columbia and how they compare to releases in other Canadian provinces.

2.8 Environmental Management Systems

An Environmental Management System (EMS) is a formal set of procedures adopted by a firm to assess and then manage its environmental impacts. It is designed to help the firm attain specific policy objectives and goals. These objectives and goals are defined by the firm and therefore reflect the firm's business, culture and priorities, making an EMS, in effect, a management tool.

Ideally an EMS focuses on the actual and potential environmental impacts of a firm's production activities and services, including the wider impacts on society and the local community in which the firm operates. A first step is to develop an overall corporate environmental strategy. Specific targets, goals and objectives are integrated into the strategy, which is based on the concept of continual improvement in environmental performance. To measure improvement in a firm's environmental performance, accurate and reliable statistical data are collected, along with other specific information about environmental impact.

How can PRTR data be used to implement an EMS?

As a first step towards assessing the scope for integrating PRTR reporting requirements into EMS, it is necessary to look at the incentives for adopting an EMS and to ask how the use of PRTR data could help a company meet its EMS objectives. To this end PRTR data could provide:

- Important data on facility specific pollutant releases and transfer to help firms set environmental priorities and monitor reductions of emissions;
- More credible release and transfer data, improving a firm's image;
- A standardized method for collecting and generating release and transfer data;
- Greater scope for continuous improvement by comparing data from previous years and from competitors by providing more effective and meaningful environmental indicators for EMS purposes and for benchmarking;
- Data collection and reporting functions are not duplicated, which represents a cost saving;
- Better regulatory compliance with the possibility of regulatory relief;
- Better relations with regulatory authorities and improved communication with government, employees, stockholders and the public in general; and
- Usually better record keeping, awareness of operation and materials used, and identification of process improvements.

2.9 Tools for presenting PRTR Data: Best Practices and Limitations

The choice of tools for using and understanding PRTR data will depend on the question or issue being addressed. Which tool may be most useful in a given situation will depend on the issue or problem being addressed as well as the data available. While the mere disclosure of PRTR data may create pressure to improve the performance of regulated facilities, more innovative solutions to environmental problems may require more innovative uses of the available tools to present information in an understandable fashion.

The tools discussed above provide different kinds of information: GIS tools can present the PRTR data in a more graphic way than just numbers and help identify potential areas for further investigation. Toxicity weighting adds information about health and environmental impacts, while risk screening adds information about potential exposure to toxic substances. Normalization is generally used to look at the economic aspects of the issues and environmental indicators attempt to combine absolute numbers, normalized numbers, and/or toxicity metrics for an issue. These tools can be tailored, and indeed combined, to meet the needs at hand.

The GIS tools may be the most widespread since they depend on little data beyond the PRTR data. They can also be quite effective in communicating with local citizens and public decision makers since they present information on a local scale. For example, the websites that allow a citizen to search for facilities within their geographic region and then rank these facilities according to issues of interest provide an effective tool easily used and understood.

The other tools depend on data not usually collected within the PRTR system, so their use will depend on the availability of the other types of data needed. For example, the toxicity weighting schemes need weights developed through scientific studies comparing toxicities of different chemicals. There are many different methodologies for developing the weights and the choice of which system may be the most appropriate for a given situation, or indeed if any toxicity weighting scheme is appropriate, is often the first step in the analysis.

The following chapter will present examples of uses of the PRTR data by the public, industry, government, and the investment and academic research communities that have employed these tools and combinations of these tools. Also, Table 3 in the Appendix is organized by the type of tool used and lists examples of uses that employed each tool.

3. USES OF PRTR DATA

3.1 Uses by the Public

3.1.1 Education

Many organizations throughout the world have used the PRTR data of their countries to produce reports, guides and other information to educate citizens about the sources and potential effects of pollution in their communities.

- The nonprofit organization Environmental Defense provides an information service website, Scorecard (http://www.scorecard.org/) that features a variety of environmental pollutant information at the local level to allow users to locate and rank sources of pollution in their community. The Toxic Chemical Releases from Industrial Facilities Pollution Locator uses the US Toxics Release Inventory. Geographic areas can be searched and ranked by zip code, state, county or facility. The website also provides information on health effects, regulatory controls, and how these data can be used in terms of social justice.[5]

- The National Environmental Trust, the Physicians for Social Responsibility and the Learning Disabilities Association of America teamed up to produce a report called *Polluting Our Future: Chemical Pollution in the U.S. that Affects Child Development and Learning*. This report uses 1998 US TRI data to document the scope, nature, and sources of chemical pollution in the US that is of specific concern for child development, learning and behavior. It estimates total likely emissions of developmental and neurological toxins in the US, identifies geographical hotspots for reported emissions, and identifies the most polluting industries. Based on the incidence and potential trends in developmental and neurological effects in children, the report recommends several policies to address this risk, including better pollution reporting.[6]

3.1.2 Improvement of Facility Performance

Environmental organizations also use PRTR data to pressure individual facilities to reduce pollution by comparing one facility's releases with another and/or over time.

- The Ontario Clean Air Alliance (OCAA) publishes Fact Sheets[7] on particular power plants in the Province of Ontario. The fact sheets are for the power plants with the largest air emissions. They describe the air emissions and their health and environmental effects, what plans the facility has for reducing the pollution, and the opportunities and costs of other pollution prevention options available to the facility. The fact sheets also describe what the government should do, whom community members can contact, and what alternate forms of energy are available to consumers.

- *PollutionWatch*, a collaborative project of Environmental Defence Canada, the Canadian Environmental Law Association and the Canadian Institute for Environmental Law and

Policy, is a website that serves as a source for information about toxic pollution released into Canadian communities. On this site, users can search Canadian National Pollutant Release Inventory data by postal code, analyze pollution trends, and learn more about health effects. Various top ten lists of polluting facilities by several criteria are highlighted.[8]

3.1.3 Improvement of Government Policies

Government agencies can also be the focus of environmental groups. Studies using PRTR data can be used to recommend new government policies or regulations to change industry behavior.

- The US Public Interest Research Group (US PIRG) analyzed US TRI data to summarize the amount of toxic chemicals discharged into US waterways in its report *Poisoning Our Water: How the Government Permits Pollution.* The organization calculated, by river, total discharges of persistent toxic metals, carcinogens, and chemicals known to cause reproductive effects. It also estimated the amount of toxic chemicals discharged into waterways through public sewage treatment plants. The report concludes with recommendations for strengthening enforcement of the Clean Water Act.[9]

- The Ontario Clean Air Alliance (OCAA) used Canadian NPRI data to characterize and rank releases from coal powered electricity generation plants of Ontario Power Generation (OPG) in *Up the Stack: Coal-Powered Electricity's Toxic Impact.* The 2002 report measures the contribution of the power generation facilities to total releases and transfers in the Province of Ontario and Canada, and ranks particular facilities in terms of releases of specific toxic chemicals. OCAA makes recommendations for the Province of Ontario government, OPG's sole shareholder, on methods to reduce pollution from these plants.[10]

- The Silicon Valley Environmental Partnership has published two *Silicon Valley: Environmental Index* reports, one for 1999 and one for 2003. These reports compile data for over 20 environmental indicators for manufacturers in the Silicon Valley.[11] The reports are intended to encourage policy makers, citizens, and businesses to take action to improve the quality of the Silicon Valley's environment, but have had impacts at regional, national, and global levels as well. For example, in California, the cities of Sunnyvale, San Jose, Oakland, Palo Alto, San Carlos, and Mountain View have all referenced or relied on the *Index* in their sustainability efforts or municipal environmental management system (EMS) initiatives. State environmental departments in Wisconsin, South Carolina, and New Jersey are using the *Index* as a model for their regional environmental indicator studies. Furthermore, the *Index* was presented at the Pollutant Release & Transfer Registers Task Force meeting of the United Nations Economic Commission for Europe Convention on Access to Information, Public Participation in Decision Making, and Access to Justice in Environmental Matters ("Aarhus Convention") in Prague, Czech Republic, February 2000.[12] The 2003 Index also examined the trends in environmental indicators and compared findings to the previous report. The Index again used US TRI

data to assess toxic chemical releases and determined that releases from the Silicon Valley manufacturers have remained relatively stable.[13]

3.1.4 Partnership with Industry

Community activists can contact local facilities directly or work together with industry leaders in their community as a group to review industry's performance and develop plans for reducing pollution.

- Community Advisory Panels (CAPs) are groups of local industry personnel interacting with community members to meet and discuss important environmental issues and develop mutually beneficial plans and actions relating to the future direction of the industries. The American Chemical Council's *Guide to Community Advisory Panels* (2001) lists the Toxics Release Inventory as one data source that industry representatives should be familiar with in preparation for community interaction. TRI data are seen as a key communication tool, and industry representatives are encouraged to use the Internet and other media to disseminate information to stakeholders.[14]

- At the Environmental Defense's Scorecard website (http://www.scorecard.org/, described earlier) users can send free faxes to each state's top industrial releasers (based on TRI data) expressing concern and a desire for increased pollution control measures. Telephone numbers are also provided for each of the top releasers for more personal voice messages.[15]

3.1.5 Partnership with Government

Environmental groups can also direct their activities toward getting governments to take actions to reduce pollution.

- The PollutionWatch website (http://www.pollutionwatch.org/, described earlier) has a feature allowing users to send free faxes. These faxes go to Canadian Environment Minister, David Anderson, expressing the user's support for expanding and improving the reporting requirements of the National Pollutant Release Inventory and urging him to undertake pollution prevention efforts that promote the elimination of the most harmful pollutants in Canada.[16]

- Several non-governmental organizations—Société pour Vaincre la Pollution, Union St-Laurent Grands Lacs (Great Lakes United), STOP, and World Wildlife Fund—combined to analyze and compare discharges along a strip of the St. Lawrence River between Valleyfield and Sorel that includes Montreal Island. (A description of this effort is found in the NPRI Guide, published by the Canadian Institute for Environmental Law and Policy.[17]) The groups' objective was to determine which dischargers were having or potentially having the greatest negative impact on that part of the St. Lawrence River. The groups used the NPRI data and two weighting systems to determine impacts on the river. The Chemiotox system was used to calculate the total toxicity of all contaminants released from a specific source, while the Biological and Ecological Effects Potential (BEEP)

system was used to calculate the potential effects of pollution on aquatic life. This weighted analysis showed that the Montreal Urban Community's new sewage treatment plant was one of the worst polluters along this part of the St. Lawrence River. The groups used this finding as a basis for a report that urged action to improve Montreal's sewage treatment system by requiring industries that discharge into Montreal's sewers to pre-treat or eliminate their toxic discharges.

3.1.6 Environmental Justice

The goal of environmental justice is to ensure that poor and minority communities do not disproportionately bear the impact of industrial pollution. Research into environmental inequality focuses on such questions as whether the burden of environmental pollution varies according to ethnic or income differences. PRTR data related to demographic data for a geographic area are one component used in determining where the burden of pollution lies, that is whether there are disparities by ethnic or income class in the distribution of environmental hazard as defined by facility proximity, emissions, environmental enforcement and clean-up activities, ambient concentrations of air pollution or other measures of pollution burden. For example, such studies use PRTR data to look at whether communities with larger poor or minority populations have larger number of facilities reporting to the PRTR system or have larger reported releases from the facilities.

- Environmental Defense's Scorecard website provides Environmental Justice analyses for each US state. These reports integrate information about pollution problems with census data to identify geographic areas or demographic groups that may be disparately affected by pollution. Four environmental burdens are examined: releases of toxic chemicals (using US TRI data), cancer risks from hazardous air pollutants, Superfund sites, and emissions of criteria air pollutants. The analysis includes an environmental justice mapper, distributions of pollution burden by race/ethnicity, income, poverty, childhood poverty, education, job classification and home ownership, locations of counties with unequal burden distributions and a comparison between the state and national results.[18]

- A 1998 report prepared by the United Church of Christ Commission for Racial Justice examines the toxic burden in St. James Parish, using US TRI data (this report is published on the Environmental Justice Resource Center at Clark Atlanta University's web page, entitled *From Plantations to Plants: Report of the Emergency National Commission on Environmental and Economic Justice in St. James Parish, Louisiana*). The report found a disproportionate amount of toxic releases per square mile, per person, and per job, in comparison to other parishes, the state, and the nation as a whole. The situation was especially significant in the town of Convent, Louisiana, the site of a proposed polyvinyl chloride (PVC) factory and an area primarily populated by African Americans and low-income persons.[19]

- The Friends of the Earth (FoE), UK, demonstrated that polluting facilities are more likely to be found in poorer communities. The 1999 report, *The Geographic Relation Between Household Income and Polluting Factories,* used data on the locations of industrial facilities registered under the UK's Integrated Pollution Control framework to show that in England and Wales the poorest families (reporting average household incomes below GBP

5 000) are twice as likely to have a polluting factory close by than those families with average household incomes over GBP 60 000. Over 90 percent of London's most polluting factories are located in communities of below average income.[20] FoE's follow-up 2001 report, *Pollution and Poverty – Breaking the Link,* focused on air emissions of carcinogens and made recommendations for changes in government actions.[21]

- At the British Columbia Institute of Technology, students in the Geographical Information Systems program used GIS to correlate the locations of industrial toxic releases and minority residences in Vancouver, Calgary, and Edmonton. The analysis used data on the locations of polluting facilities and the amount of toxic emissions gathered from the Canadian NPRI. The project also used a chemical dispersion model to calculate health risks based on concentrations of chemicals. Researchers noted that a more current analysis could be conducted if more recent data were available, since the current-year data were not available for either NPRI or census data.[22]

3.1.7 Assistance to Others

Public interest groups skilled in using PRTR data can be of technical help to citizen activists in a local community who may be aware of problems but are not aware of resources available to study the problems and learn about actions activists could take to promote the reduction of pollution.

- The Access Initiative (TAI) is a global coalition of public interest groups collaborating to promote national-level implementation of commitments to information access, participation, and justice in environmental decision-making. This organization has developed a set of tools to help civil society groups measure how well governments are performing in a number of areas, including access to information, public participation, and justice in decision-making for the environment. These tools are found in their publication *Assessing Access to Information, Participation, and Justice for the Environment: A Guide*. Areas TAI recommends examining to assess the comprehensiveness and quality of a government's general legal framework are industry reporting requirements such as requirements for compliance reporting, pollutant emission registries and/or pollution release and transfer registries. The indicators used to evaluate a government's use of a PRTR system are existence of a mandate or legal requirement to collect and disseminate PRTRs, existence and quality of a system to collect/maintain PRTRs, efforts to disseminate information about PRTRs and the quality of PRTR information available to the public. The guide describes research methods to collect and assess this information.[23]

- The Canadian Institute for Environmental Law and Policy (CIELAP) is helping to make Canadian citizens more aware of what pollutants are being released into their environment and by which facilities with its easy-to-read *Citizen's Guide to the National Pollutant Release Inventory*. This guide helps readers understand what information they can find using the Canadian NPRI, how to access the NPRI, and how to use NPRI data, and gives examples of how others have used the NPRI.[24] CIELAP has also created and distributed educational posters that show pollution hotspots and list top on-site releases and off-site transfers of pollutants by facilities across Canada in 2000, 1998, and 1996, using data from the NPRI.[25]

- The Right-To-Know Network hosts a website (http://d1.rtknet.org/tri/) to provide downloadable US TRI data, as well as data from other USEPA and US governmental databases. Users may find this database a bit more user-friendly than the official TRI database on the USEPA website. Searches can be done by geographic area, facility, industry, parent company, and off-site waste transfer. Search results are shown online, or can be e-mailed to the user for convenient later use.[26]

3.1.8 Uses by the Public: Best Practices and Limitations

Public citizens and groups use PRTR data in a wide variety of ways, most commonly, to deliver information to the community about polluters in their areas. The methods and formats used to analyze and distribute PRTR data vary greatly in level of sophistication, depending on the group's resources and purpose.

The best reports are easy for the public to read and understand, and not only present data but also describe what the nation's PRTR system is, how it works, how community members can access these data, and what questions the PRTR system can answer. For example, the *Citizen's Guide to the National Pollutant Release Inventory*[27] describes who reports, what they report, and how to obtain the data. It gives a simple walk through of the Internet web site provided by the Canadian government and how to interpret the data in making year-to-year and facility-to-facility comparisons. Then the Guide gives examples of how others have used the data.

The best reports also present results of common interest, such as trends in pollution for local industries, highlighting the "worst" polluters in the context of the potential human health and environmental risks caused by such emissions, and provide suggestions for community action. For example, the Ontario Clean Air Alliance's *Fact Sheets*[28] are just two pages, but list the pollution of concern, what has happened over the last few years, what could be done to reduce pollution, what the costs are, and what steps a citizen could take to effect the changes advocated.

Such reports compare their communities to other similar areas. Applications related to environmental justice further correlate pollution levels to factors such as the race and income of nearby residents, using census or other demographic data.

Successful computer-based applications, such as online databases that provide the public with access to PRTR data, are designed to be very simple for the user to understand. A good Internet application has easy and comprehensive search capabilities; provides examples of how others have used the data; and provides pre-formatted popular results, such as "top ten lists" for major areas and pollutants. These websites are linked to health and environmental effect information, and may be supplemented with suggestions for actions that people can take to address their concerns. For example, the *Scorecard*[29] site by the US Environmental Defense can rank on a particular environmental issue, such as health risks or environmental releases, for three levels of geographic area (state, county and postal code) or by facility.

Limitations and difficulties faced by organizations putting together these reports include the fact that PRTR data are not collected for all pollutant chemicals, or all categories of emitters, so the complete level of pollution in an area cannot be determined. Without such additional information, it may be difficult to put the PRTR data in the context of other important sources of

pollution. Report authors must do their own research on health and environmental effects of pollutants and demographic data, as these are not part of a PRTR system, and the quality, use, and application of such data can vary substantially.

3.2 Uses by Industry

Although the primary purpose of PRTR systems is to inform the public, industry has also benefited by using the data both internally and in its relations with the public.

3.2.1 Pollution Prevention and Reduction

Industry has used PRTR data to investigate sources of pollution, investigate opportunities for prevention, set reduction goals, and measure progress toward those goals.

- 3M Company recently initiated an Environmental Health and Safety (EHS) Management System for its facilities worldwide to address environmental sustainability issues and track progress. As part of this tracking system, 3M uses an EHS Scorecard to measure certain eco-efficiency performance metrics at its operations. For the US-based operations, one of the metrics used is releases reported to the US Toxics Release Inventory. According to 3M's most recent report, TRI releases in 2001 were 990 lbs/USD million sales, down from 1,298 lbs/USD million sales in 2000. The company has set as one of its new environmental targets for 2005 to reduce TRI releases by 50 percent of the 2000 level (down to 649 lbs/USD million sales). 3M uses TRI releases as one example of how its pollution prevention and control programs have been achieving results: since 1990, there has been an 88 % reduction in TRI releases.[30]

- Sharp Company's *Environmental Report 2002* assesses its environmental achievements for the fiscal year 2001. In this report, Sharp describes the company's releases of 16 substances covered under the reporting requirements of Japan's PRTR Law, listing amounts of each chemical released to the atmosphere, water, landfills or sewerage both by business site and company-wide. Sharp also pledges to disclose in the future information regarding various risks involving these chemical substances. Through such risk communication, the company hopes to build a relationship of mutual trust with the communities surrounding its facilities. In setting reduction targets, Sharp goes above and beyond PRTR reporting requirements. The company's goal for fiscal year 2003 is to reduce by 50 % (compared to fiscal year 2000) the discharge in Japan of "chemical substances that must be managed on a priority basis". These priority substances are not only substances regulated by the Japan PRTR Law that are released or transferred in large amounts, but also include substances not covered under the Japan PRTR Law but that are regulated under other environmental laws. They also include substances that cause annoyance to people living near Sharp facilities, even if the amount is small.[31]

3.2.2 Cost Reduction

PRTR data show releases of chemicals, which, if reduced, can often save raw material and operating costs. These cost savings can be compared to reduction or pollution control costs for the overall benefits of particular reduction actions.

- The Acushnet Rubber Company in New Bedford, Massachusetts, USA, designs and manufactures golf equipment, sealing rings, and custom molded products including liquid cast polyurethane products for automobile manufacturers, the aerospace industry, and others. It became one of the first companies in this industry to establish an EMS, and it is ISO 14001-certified. Under the EMS, Acushnet used the TRI list of chemicals and applied the following criteria to identify and develop reduction targets. The criteria included hazardous waste disposal costs, impact on human health and toxicity rating, material costs and likelihood of noncompliance. Acushnet used trichloroethylene (TCE) as a vapor degreaser to clean metal parts used in the stamping process. The TRI-listed chemical TCE, which has high disposal costs and is listed as a potential carcinogen by the International Agency for Research on Cancer, was identified for complete elimination. This was accomplished by convincing suppliers to replace the grease coating with a water-based lubricant, and incorporating a two-step aqueous cleaner to replace TCE. The elimination of TCE at the facility saves approximately USD100 000 per year.[32]

- The Matsushita Electric Group's *Environmental Sustainability Report 2002* describes its environmental policy and details its environmental management strategies, which include the acquisition of ISO 14001 certification. Measurements include the costs and benefits of environmental conservation. As part of its Green Plan 2010, Matsushita sets targets for reductions in the amounts of use, release, and transfer of chemical substances for fiscal years 2005 and 2010. Substances to be included for these targets include those specified by Japan's PRTR Law. PRTR data are used to measure progress against targets and are provided for each Matsushita facility in Japan. PRTR data are also summarized by global region (Japan, Americas, Europe, China, and Asia/Oceania).[33]

3.2.3 Public Disclosure of Environmental Data

In today's market, a clean environmental record is becoming important to businesses. Industry associations recommend methods of disclosing environmental data. For example, The Responsible Care programme, an initiative of the global chemical industry, was designed to improve the health, safety, and environmental performance of the industry and improve communication and accountability. Waste and emissions reporting is recommended; use of PRTR data varies by country.[34] The Global Reporting Initiative (GRI, a joint initiative of the Coalition for Environmentally Responsible Economics and the United Nations Environment Programme) published *2002 Sustainability Reporting Guidelines,* a set of voluntary guidelines for organizations to report on the economic, environmental, and social dimensions of their activities. This benchmark for public disclosure includes emissions, effluents, and waste as important environmental indicators. GRI recommends reporting waste materials by type and by destination.[35] It is up to the individual company to make the data public. As described below, several corporations use their reported PRTR information to satisfy their environmental public disclosure needs.

- The Ajinomoto Group, a Japanese food and pharmaceutical company, discusses its compliance with Japanese PRTR legislation and lists the amounts of PRTR substances released to air, water, and soil in both its 2001[36] and 2002[37] Environmental Reports. The

reports describe Ajinomoto's environmental policy and environmental management system, and use PRTR data in their approach to controlling chemical substances.

- The Canadian Petroleum Products Institute (CPPI) prepares annually an *Environmental and Safety Performance Report* to review the activities and performance of its member companies. Among other environmental characteristics, this report includes an analysis of the amount of substances released from member refineries based on Canada's NPRI. Trends in releases are tracked, both for all CPPI refineries and by region.[38]

- General Motors Corporation issues an annual *Corporate Responsibility and Sustainability Report*, a section of which describes the company's impacts on the environment. Toxic chemical emissions from General Motors North American facilities are quantified using U.S. TRI data and Canadian National Pollutant Release Inventory (NPRI) data. (Emissions from Mexican facilities are not tracked, as Mexico currently does not have a similar data tracking system.) The data are summarized per vehicle produced and the total quantities released into each environmental medium are listed.[39]

3.2.4 Assistance to Others

Companies, usually larger firms, which have developed pollution prevention plans and projects and compliance procedures, share these methods with their suppliers as well as smaller companies.

- The Northeast Business Environmental Network[40] is a group of companies that share information about pollution prevention, environmental compliance, and health and safety issues with member companies. The "Peer Assistance Program" matches members with small and medium-sized businesses. The project to assist in the development of Environmental Management Systems was the result of a grant from USEPA.

- A partnership between the governments of Canada and Chile, called the Council of the Canada-Chile Commission for Environmental Cooperation, sponsors workshops where industry can share information and experiences in the area of information systems for tracking and management of environmental information. [41]

- The DuPont Company, a multinational manufacturer of chemicals, and Enviance, an environmental technology company, teamed together to develop software for the preparation of the USEPA-mandated Toxics Release Inventory report. The software can be used by a company to calculate and analyze the emissions data required to complete the TRI reporting requirements. The software reduces the time needed to prepare the report, but also allows data to be analyzed on a corporate level and compared by business unit, facility, and state.[42]

3.2.5 Environmental Management Systems

Many firms are already using their PRTR data to report on plant level releases and transfers required by national PRTR systems in their EMS reports. Below are some examples of how some companies used PRTR data as part of their EMS:

- Du Pont is unique in including in its annual report a graph of data for 1991–1996 reported to the US Toxic Release Inventory (TRI). This helps them meet their public transparency aspect of EMS.
- In its 1999 environment report, the UK energy company Powergen introduced a section on environmental performance with a comprehensive summary of their data reported under the Pollution Inventory (i.e., PRTR data). This explained that the emissions data tables and other data in the report included all data reported under the Pollution Inventory, as well as additional substances covered by the precursor to the Pollution Inventory, the Chemical Release Inventory (CRI). Interestingly, the report also noted Powergen's success in the results of an external environmental benchmarking study conducted by the Société Générale de Surveillance (the world's largest inspection, testing and verification firm). The study concluded that "Powergen is a leader among fossil fuel based utilities that we have analysed". This data was helpful in measuring and communicating the performance of their EMS.
- Another company using PRTR emissions data in its EMS is the Sony Group. In the section on the reduction and management of chemical emissions, Sony's environmental report stated that "the PRTR system promoted by the OECD member nations will play an important role in Sony's efforts to upgrade the management of chemicals." The report explained that Sony had conducted PRTR surveys at 40 of its locations in Japan to assist the Japanese authorities develop a national PRTR system. Sony also releases annually to the public data submitted under PRTRs, in its report on environmental pollutants.

3.2.6 Uses by Industry: Best Practices and Limitations

Industry's use of PRTR data focuses on two areas: use of the data in public reports to increase public understanding of industrial operations' impact on the environment and their internal use to identify pollution prevention opportunities.

Well-written public reports by industry can usefully convey their information to the public. The best industry environmental reports present their data in a clear and complete fashion, incorporating such features as tables that list the amounts of chemical released into each environmental compartment, over the past several years. Vague summary numbers, such as "our TRI releases have decreased 50 percent since 2000" should not be the only information provided. The full and clear presentation of the data gives the public a better idea of what the trends are for specific pollutants and gives the report more credibility. For example, the Matsushita Electric Group's *Environmental Sustainability Report 2002*[43] lists PRTR data by substance for each of its Japanese facilities. It evaluates progress in achieving its environmental management goals by displaying a materials balance chart that shows how much of the materials are used, recycled, shipped as products, and released. The report also relates the amounts of waste generated and recycled over time to show that recycling has increased.

Well-written public industry reports should relate their emissions data to potential health effects to give the public some context and an understanding of the level of risk caused by the facility. For example, the Acushnet Rubber Company[44] described how it used the PRTR list of chemicals to identify substances to target for reduction and then further refined the list based on human health effects (potential carcinogen).

Industry environmental reports should normalize their pollution release data to amount of sales/production. Normalization eliminates the illusion that large environmental strides have been made in what was merely a financially poor year (less production, less pollution). This is important for both the public's understanding of the company's impacts as well as for pollution prevention staff in measuring their success. Industry reports that present releases for individual facilities (e.g., through separate lists for each business site, or maps that illustrate comparative levels of releases) give local residents a better idea of what the concerns are for their community and allow them to track each facility's trends.

In their environmental reports, multinational companies generally report toxic chemical releases only for their facilities that are located in countries where such data collection is required by law. Presumably, if the data can be collected in one region of the world, they could also be collected in another region. One possible area of improvement would be for these companies to collect and report toxic chemical release data to the public for all their locations, even if it is not legally required. For example, 3M emphasizes that it's US TRI releases have decreased and sets pollution reduction goals based on TRI releases, but does not mention any trends in pollution for its operations in 60 other countries.

The more comprehensive industry environmental reports list pollution levels and reduction goals for pollutants in addition to those listed on the national PRTR system. One recommendation for national PRTR programmes would be to increase the number of reported chemicals; this could improve consistency among company reports.

Internally, the "ideal" industrial pollution prevention plan would use PRTR data to determine where the highest levels of releases are and where the worst health effects are possible (based on risk assessment and GIS modeling), produce a plan to target these emissions for reduction (for example, through environmental indicators), and report trends annually. Each tool described above has a role to play in this type of internal planning. None of the examples we found indicate such a full application of the tools, but it is difficult to locate such examples because full descriptions of internal company processes for pollution prevention planning are not usually available outside the company.

3.3 Uses by Government

Government agencies can use PRTR data in a variety of their activities, including evaluating programs, developing regulations, encouraging voluntary industrial actions without the time and expense of new regulations, and educating the public.

3.3.1 Environmental Improvements

Some activities of government aim to bring about environmental improvements through the use of PRTR data to demonstrate progress in pollution reduction. Several governments have undertaken programmes that solicit voluntary pollution reduction goals and then measure progress toward the goals of the PRTR data.

- The UK's Environment Agency's *Spotlight 2002* is the fifth annual report on business environmental performance. Based on environmental data, including PRTR data, that the Agency collects in the course of its activities to control pollution, the report presents a

sector-by-sector analysis of businesses and industry in England and Wales. It highlights good and bad performers and details the main prosecutions brought by the Agency over the year.[45]

- The 33/50 Program was a US programme that targeted 17 chemicals reported to the Toxics Release Inventory. The US Environmental Protection Agency (USEPA) asked companies to participate voluntarily in a national effort to reduce the releases and transfers of these chemicals. Using the 1988 TRI data as a baseline, the Program sought to achieve a 33 percent national reduction in releases and transfers by 1992 and a 50 percent reduction by 1995. Companies were asked to set their own goals, with some companies pledging a 100 percent decrease in releases and transfers for the 17 chemicals. USEPA encouraged companies to meet these commitments through pollution prevention whenever possible. The Program achieved its goal in 1994, a year ahead of schedule. Source reduction for the 17-targeted chemicals was greater than for other TRI chemicals, and reductions continued at a higher rate even after the Program ended.[46]

- Environment Canada's Accelerated Reduction and Elimination of Toxics (ARET) programme is a similar example of voluntary efforts to reduce toxic emissions. ARET seeks, through voluntary actions, the virtual elimination of 30 persistent, bioaccumulative, and toxic substances and significant reductions in emissions of another 87 toxic substances. Participants from nine major industry sectors and government use the ARET programme to prioritize emission reductions and determine appropriate reduction and elimination methods.[47] While many of the substances were on the NPRI list, not all were, and the baseline data were not publicly available because the programme started before the NPRI was established. This led to criticism of the published results since they were not verifiable with publicly available data.

- PRTR data on releases of greenhouse gases or other pollutants as NOx and SOx into air could be used as basic data for *emission trading schemes***.** The reporting of these data by facilities should be subject for streamlining and wherever possible the data should be identical.

- Under Indonesia's public environmental reporting initiative, the Program for Pollution Control, Evaluation, and Rating (PROPER), the government's Environmental Impact and Management Agency evaluates facilities for their environmental performance, based on criteria such as emissions and other waste. The results are reported to the public, with six months' notice first given to the polluter. Results of the Program indicate that half of those notified improved their rating before public disclosure.[48]

3.3.2 Regulatory Compliance

Government agencies also use PRTR data to investigate and measure compliance with regulations. Within limited budgets, PRTR data can help prioritize and target initiatives.

- USEPA's Integrated Data for Enforcement Analysis (IDEA) system is a single source of environmental performance data on regulated facilities within the United States. IDEA

gives a historical profile of inspections, enforcement actions, penalties assessed, toxic chemical releases and transfers (US TRI), and hazardous spills.[49]

- The Massachusetts Office of Technical Assistance for Toxics Use Reduction[50] was set up to assist industrial facilities, municipalities, schools, hospitals, and households to reduce or eliminate their use of toxic chemicals and their generation of hazardous waste. The PRTR system of Massachusetts requires pollution prevention planning for industrial facilities. Case studies prepared by this office show how the use of the PRTR data can identify pollution prevention opportunities.

- USEPA's Brownfields Project[51] describes the uses possible for LandView in assessing a site for redevelopment. The LandView mapping tool can assist in developing an inventory of potentially contaminated properties as well as existing facilities that may impact the environmental and economic feasibility of beneficial reuse options for a site. The census data provide demographic data such as population, household income, labour force participation, and educational attainment for the area.

3.3.3 Development of Policies and Regulations

PRTR data can be useful in developing new policies and regulations. The data may identify problems or be used to assess proposed rules and regulations and develop new policy.

- New regulations of the Canadian Environmental Protection Act (Section 200) require companies to have an Environmental Emergency Plan for the prevention of, preparedness for, response to, and recovery from an environmental emergency for a listed substance. Canada's NPRI database is used as one source to list companies possibly covered by the regulation.[52]

- USEPA uses TRI data in several programme areas in developing policies and programmes. For example, in its National Air Toxics Program to address cumulative health risks in urban areas, the TRI data were used in establishing a baseline inventory of sources of toxic air pollutants.[53] Also, the TRI data were used in selecting chemicals to study under the Contaminated Sediment Management Strategy.[54]

3.3.4 Programme Evaluation

PRTR data have been used to assess the progress made under the right-to-know programmes and to assist in the development of such programmes in other countries.

The Corporate Scorecard is a management system for the United Kingdom's Environment Agency to measure its corporate performance in delivering the 17 key strategic short and long-term goals detailed in the Corporate Strategy. The system sets quarterly and annual outcome measures for each goal, which include both environmental outcomes and Agency "corporate goals." Four of the strategic goals require PRTR data to measure progress: cleaner air for everyone (reduction in key pollutants from Agency regulated industrial processes), restored, protected land and healthier soils (reduction in air emissions to reduce the area of land where critical loads are exceeded), wiser, sustainable use of natural resources (reduction in waste

produced by sites and across Agency regulated industrial sectors and increase in waste recovery or reuse) and limitations on and adaptation to climate change (reduction in greenhouse gas emissions from Agency regulated processes).[55]

- The North American Commission for Environmental Cooperation's North American Pollutant Release and Transfer Register Project prepares reports comparing the North American national PRTRs (US TRI and Canadian NPRI). The project seeks to facilitate collaboration among the PRTR programs, increase the amount of comparable information, and assist in the development of a PRTR in Mexico.[56]

3.3.5 Risk Assessment

As the connection between releases and public health and ecosystem impacts has become better known, government researchers have used PRTR data in conjunction with toxicity, demographic, and other data to assess risks.

- Japan's Organization for Research and Communication on Environmental Risk of Chemicals maintains a website with a mapping tool that includes PRTR data by location, monitoring data for air and water quality, and demographic data. Users can search by prefecture, substance, industry sector, and type of release. The site also includes a model to simulate the impact of a new source. *(Please note that this website is in Japanese.[57])*

- USEPA's Risk-Screening Environmental Indicators (RSEI) model is a tool that compares toxic chemicals released to the environment from industrial sources, using data from the US TRI. The model incorporates information such as the amount of chemical released, the location of that release, the toxicity of the chemical, its fate and transport through the environment, the route and extent of human exposure and the number of people affected, to assess the relative hazard and risk of chemicals, facilities, regions, or industries.[58]

3.3.6 Education

PRTR systems were developed under the community right-to-know programmes that aim to provide the public with information, increasing the public's awareness of pollution problems and encouraging people to become involved in solutions to the problems. Most government agencies make the data available to the public on the Internet. The wide variety of PRTR systems reflects the differing needs and purposes of the individual countries. The websites of several OECD countries that are listed in this paper reflect the variety of approaches to making the PRTR data publicly available.

3.3.7 Regional and International Obligations

Countries sign agreements to develop programmes and take actions to reduce pollution on a regional or global scale. PRTR data can be useful in developing the programmes and in evaluating their progress under such agreements.

- Member States of the European Union are required to report emissions (air and water) information from specified industries on a list of 50 pollutants every 3 years (2001 as

reported in 2003 was the first year).[59] The PRTR data from individual countries are collected and publicly accessible on the Internet site.[60]

- The International Programme on Chemical Safety, a co-operative programme of the World Health Organization (WHO), the International Labour Organization (ILO), and the United Nations Environmental Programme (UNEP), develops Concise International Chemical Assessment Documents.[61] These are risk assessment documents for individual chemicals. The documents provide summaries of potential human health and environmental effects of the chemicals. PRTR data are included in the section on anthropogenic sources of human and environmental exposure. The chemicals are typically high production volume chemicals and are of transboundary concern to a range of countries.

3.3.8 Uses by Government: Best Practices and Limitations

Government plays multiple roles in the ways PRTR data are used. When government makes the data easily accessible to the public, it increases use of the data. Providing the data along with the context, including scientific (such as toxicity, environmental fate, exposure potential for the substances), technical, operational, or programme background and their limitations, enhances the understanding of the PRTR data and their use as a performance measure and communication tool. For example, most governments that provide Internet access to their PRTR data have a website that allows a user to search for a particular facility usually by geographic area. Some sites will allow searches that rank facilities within a certain geographical area based on their releases. Further information on sources other than individual facilities is presented on the more comprehensive sites. For example, the Australian National Pollutant Inventory[62] data website will map sources of individual chemicals that include reporting industrial facilities and aggregated data for smaller facilities, mobile and non-industrial facilities. Other government websites include maps that locate not only the reporting facility but other sites as well. The United Kingdom's Pollution Inventory[63] maps the location of reporting facilities, landfills, river quality monitoring stations, flood plains, and groundwater protection zones. Japan is developing a PRTR website[64] that is still more comprehensive. It was developed as a tool to utilize PRTR data in an environmental risk assessment at the regional level and includes PRTR data from existing facilities as well as population and land use data, geographic data such as watershed areas, and estimated ambient air concentrations of substances.

Mandatory PRTR data used as a baseline for voluntary pollution reduction programmes provide the necessary transparency for public acceptance of measuring progress that industry run voluntary programmes may not have. The sponsoring government agency should also ensure that reductions in targeted pollutants are not offset by increases in other pollutants.

The degree to which PRTR data can be a useful resource to programmes within the government depends on the goals, scope, and purpose of the particular government programme. As with uses by the public and industry, programmes that use PRTR data for compliance targeting and to locate companies possibly covered by certain regulations or to develop new programmes are also faced with the limitations in the PRTR data themselves. Monitoring achievements and prioritizing actions to reduce pollution using PRTR data may be limited by the number of pollutants reported and the industries required to report under the PRTR system. For other pollutants of concern or small companies and certain types of industries, data may not be publicly available.

Models that calculate levels of risk caused by pollutants are also limited by these factors, as well as the availability of demographic and exposure information. Accurate geographic location information for pollutant sources is essential for these models.

There are many more instances of uses of PRTR data within government programmes that may not be readily apparent to the public since they are not formal reports but working papers to target compliance activities, technical assistance, or monitoring and inspection programmes.

3.4 Uses by Investment Community

The investment companies have begun to provide environmental performance data along with financial data to investors. The environmental performance data are used to identify or screen companies for investment purposes as well as to track and rank a company's performance.

3.4.1 Assessing Environmental Performance of Companies

Several investment research services are providing potential investors with an index covering many different companies. The index typically ranks environmental and social impact along with financial factors.

- The Ethical Investment Research Service (EIRIS) is a nonprofit European organization that performs independent research on the social, environmental, and ethical performance of companies. It provides information to private and institutional investors, charities, companies, and independent financial advisors based on environmental data, including PRTR data.[65]

- The Independent Global Index Company has designed its "FTSE4Good Index Series" to measure the performance of companies according to global corporate responsibility standards. The index classifies a company's environmental impact (low, medium, high) based on PRTR data and other environmental data. This index covers US, UK, and European markets.[66]

- The Investor Responsibility Research Center maintains a "Corporate Environmental Profiles Database" to provide information on environmental performance used in portfolio screening. The database uses TRI and other USEPA data.[67]

3.4.2 Tracking Environmental Performance of Companies

Investment research firms also track the performance of companies, comparing their performance to prior years as well as to other companies within their industry.

- Dow Jones Sustainability Indexes track the performance of companies in terms of corporate sustainability and rank companies within their industry sector. Both a global and European set of indices are kept. Sources of information for the assessment are responses to a standard questionnaire, submitted documentation, policies and reports, publicly available information, and a research analyst's direct contact with the companies. The questionnaire includes environmental performance information, PRTR data such as trends

in total waste generation, percentage of waste disposed of in landfills, how frequently data are collected and maintenance of a centralized database.[68]

- The Groupe Investissement Responsable (GIR), based in Quebec, Canada, provides investors with industry analyses of environmental performance. GIR will soon publish reports on the Canadian Oil and Gas and Forest Products sectors, which will utilize Canadian NPRI data.[69]

- The Commission for Environmental Cooperation of North America has an ongoing project on the Environment, Economy and Trade that is investigating, among other issues, how to strengthen partnerships with the private financial services sector in the area of finance and the environment. A meeting of representatives of financial institutions, academia, industry consultants, and government in March 2002 focused on transparency, disclosure, and environmental reporting. The purpose of the meeting was to explore the extent to which the disclosure of environmental information through mandatory or voluntary channels affects the business decisions of different actors in the financial sector. One example of disclosure of such data is the PRTR system.[70]

3.4.3 Uses by Investment Community: Best Practices and Limitations

The investment community can use PRTR data as one of a number of sources of environmental data to assess and rank a company's environmental performance. The best assessments use many different types of environmental indicators to calculate an index.

In their use of PRTR data, organizations that rank the investment potential of companies based on their environmental performance should be sure to normalize pollutant emissions to levels of productivity in order to compare across companies of different sizes. They should also take into account the relative toxicity or environmental risks caused by the pollutants emitted. They should be fully transparent in how PRTR data are used. However, since these are companies providing a service to investors for a fee, the methodologies used by particular services are proprietary and not disclosed in their details on the websites. Thus, they cannot be evaluated or compared by the general public.

3.5 Uses by Academic Research Institutions

Academic and independent research institutions use PRTR data extensively in their basic research, in the classrooms, and in applied research undertaken in partnership with government agencies.

3.5.1 Basic Research

In March 2002, the North American Commission for Environmental Cooperation (CEC) hosted the Workshop on Exploring Pollutant Release and Transfer Data in North America: Experience and Future Opportunities in the Academic Community. Workshop participants, consisting of academics from North America, discussed their experiences with using PRTR data as economic and social measures, environmental and health measures, and effectiveness of public policies. Among the workshop findings were:

- PRTR reporting can lead to improvements in economic efficiency;
- PRTR data can be used to understand the effects of firms' environmental performance on profitability, market value, and investment decisions;
- The availability and communication of PRTR data promote actions to improve human health and welfare;
- PRTR data can be used to identify trends, such as shifts of toxic chemicals from on-site to off-site releases or from one environmental medium to another, or shifts in the composition and toxicity of waste streams;
- PRTR data support the development of multimedia contaminant fate models that link releases to contaminant concentrations in air, water, and soil; and
- PRTR data have triggered the development of innovative, flexible toxics reduction programmes, and are used as a tool for tracking progress within such programmes.

Workshop participants identified several questions for further investigation and research, and provided recommendations to build stronger relationships among academics, researchers, governmental agencies, and legislators and to continue efforts to enhance comparability among national PRTRs.[71]

- Researchers affiliated with the Political Economy Research Institute (PERI) at the University of Massachusetts, Amherst examined the usefulness of USEPA's Risk-Screening Environmental Indicators model (discussed above) in analyzing environmental justice issues. The RSEI model was used to estimate risk-related impacts associated with TRI air releases for each square kilometer in the United States. By coupling this information with census data, the relationship between risk-related impacts and demographic variables such as race, income, and age can be compared. This analysis revealed patterns of inequity such as higher risk for colored people compared to whites, and higher risks in areas of higher levels of unemployment. These results can be used to inform and empower citizens' groups, and aid decision-makers in correcting disparate impacts. The usefulness of RSEI would increase if it contained race and income data from the US Census (currently it contains only age and gender related population data), and included more chemicals in addition to those that are TRI-listed.[72]

- Another researcher with PERI examined how firms externalized environmental costs and calculated a "pollution subsidy" which is the cost ~~s~~ that manufacturers avoid by spending less than the national average per pound of toxic pollution times the total pounds released in a state. The data on pounds of toxic releases were taken from the US TRI. The report affirms that to reduce or eliminate pollution, businesses should be required to internalize their environmental costs.[73]

- The Rose Foundation for Communities and the Environment, a US organization that manages grant making, donor-advised, contract, and direct project funds, has prepared a report, *The Environmental Fiduciary*, which shows that corporations that perform better

environmentally also tend to produce better financial results. One analysis examined the relationship between emission reduction and firm performance, using reported emissions from sources like TRI. They found that emissions reductions enhanced both financial and operating performance in the years following the reduction.[74]

- A student at the University of California Riverside Department of Economics prepared a paper analyzing the causes of relocation of firms from the US to Mexico, and how this relocation affected their environmental performance. PRTR data were used to identify firms and to measure their change in waste generation before and after relocation.[75]

3.5.2 Use in Classrooms

While PRTR data are used extensively by academic researchers, their use in classrooms is more limited. For PRTR data to be most useful in elementary and high school classes, references to specific lesson plans are needed, and these vary from school to school. Several Canadian environmental organizations have however developed some classroom material.

- The PollutionWatch[76] website provides classroom teaching guides for both elementary and high school classes. These are guides for the use of two published maps of Canada that display NPRI data. There are two versions of the map: one that has top-ranked facilities and a breakdown of releases and transfers by province, and a less complicated one with top-ranked facilities located by province. The simpler map was developed in response to the first one, which some users found too complicated. The classroom teaching guides are being updated to make them more specific to lesson plans for particular grades.

- The Pembina Institute for Appropriate Development[77] gives classroom demonstrations of the Canadian PRTR data using the NPRI and Commission for Environmental Cooperation (CEC) websites. The CEC website is used to compare Canadian and US data. The data set could be enhanced to cover educational and research institutions so that students could use such data to research pollution within their own institutions.

- The Toxics Use Reduction Institute offers a course to business people on toxics use reduction planning.[78] Toxic use reduction plans are required under the Massachusetts PRTR system. The course shows how to identify and prioritize waste reduction opportunities, and develop goals and objectives for reducing toxics. It uses classroom demonstrations as well as on-site visits.

3.5.3 Applied Research

Government environmental agencies in several countries have teamed up with independent research institutions to conduct studies of interest to the government and the public use of the PRTR data collected by the government agency.

- Ireland's EPA and the Clean Technology Centre of the Cork Institute of Technology conducted a study, *Environmental Benchmarking for IPC Industries*,[79] that investigated environmental practices and the use of environmental indicators and benchmarking of performance by facilities required to report to the Irish PRTR system. The indicators were

considered a basic management tool and a key to continuous improvement. The study found that multinational companies used indicators more than Irish companies and that companies with a certified EMS were more likely to use an indicator.

- The TNO Environment, Energy and Process Innovation Company[80] maintains the data warehouse for the Netherlands PRTR. The warehouse includes data on releases to air, water, and land, as well as data on the generation of waste. The organization also prepares reports for national, regional, and municipal governments, industry and trade associations using PRTR data. Data are used to assess the effects of environmental policy, to ascertain trends and to supply inputs for modeling studies.

- The Toxics Use Reduction Institute[81] works with the Massachusetts Office of Technical Assistance to award grants for projects by community and environmental organizations and local government to raise awareness and work on reducing toxic chemical use. One example was a regional workshop on toxics use reduction that provided an overview of PRTR data, alternatives to toxics use, pollution prevention opportunities and resources available from state agencies for businesses.

3.5.4 Uses by Academic Research Institutions: Best Practices and Limitations

The value added by academic research lies in the development of tools and the capacity to relate PRTR data within many different contexts. Such basic research can ask questions that relate to more than a single interest group (public, industry or government) and can develop complex methodologies that incorporate many different databases and/or perspectives.

The use of PRTR data in research may be limited by the lack of standardization of several variables across databases, including geographic data (latitude/longitude), company names, ways to link to financial databases and information on facility size or production units/levels and coverage of the PRTR universe of facilities. To be most useful, the studies must be circulated beyond the institution or professional journals where other interested parties can learn from their investigations.

To this end, several governments have partnerships with academic or independent research institutions and the resulting studies and reports may be available through the Internet. For example, while the PRTR data for both Ireland and the Netherlands are not available through a government website, they do have partnerships with independent research institutions to conduct studies and report on findings using the data. The TNO Environment, Energy and Process Innovation Company[82] maintains the PRTR data for the Netherlands and prepares many reports for the Dutch Government. The Clean Technology Centre of the Cork Institute of Technology[83] has done several environmental assessment studies for the Irish Government.

4. DETAILED EXAMPLES OF PRTR DATA USE

This report briefly presents above over 100 examples of uses of PRTR data from many different countries and a variety of PRTR systems. This section selects five examples of PRTR data use for more detailed discussion to demonstrate how PRTR data can be effectively used for information sharing and pollution reduction purposes. These and the other examples in this report indicate that many PRTR data uses could also be considered for implementation in other countries or other settings.

The first two examples are of websites maintained by governments that incorporate PRTR data and other information into maps and graphics that give important perspectives and context for the PRTR data. The third case study demonstrates a governmental use of PRTR data to inform business and the public of its commitment to reducing pollution and improving environmental performance. The final two case studies describe the efforts of two non-governmental organizations to provide easy access to PRTR and other data with the aim of providing an expanded context for the data and its potential uses.

4.1 Australia's National Pollutant Inventory Website

The Australian National Pollutant Inventory[84] website maps sources of individual chemicals, including reporting industrial facilities, estimated aggregate data for smaller facilities, mobile and non-industrial facilities, such as transport (motor vehicles, railroads, shipping), domestic activities (backyard incinerators, lawn mowing) and land use types (agricultural, livestock).

The data can be searched geographically by postal code, by airshed or water catchment area. It can also be searched by type of source (e.g., industry group, non-industrial types), including by facility, type of emissions to airsheds (e.g., motor vehicles, dry cleaning, fuel burning, incineration) and type of emissions to water catchments (e.g., agriculture, grazing, fish farming, industrial). Searches by substance provide all sources within the geographic area selected.

The data can be viewed online as a map of the area selected with the location of facilities indicated, and a chart showing the percentage contribution of a source. Further details of the releases of each facility or other type of source are also available. The data can be downloaded as a spreadsheet.

For searches by substance, a profile of the chemical is offered. It includes chemical properties and a list of common uses and sources of emissions, health effects and environmental effects. There is also a "hazard rating" for health and environmental effects, which compares the substance to about 400 other substances. The hazard ranking is based on health and environmental hazard identification and human and environmental exposure to the substance and is given for

health effects and environmental effects separately as well as a total hazard score combining the health and environmental criteria.

4.2 Japan's Eco-Chemi Website

The law requiring reporting of PRTR data by Japanese firms took effect in April 2001. The first data were reported in March 2003. Japan's Organization for Research and Communication on Environmental Risk of Chemicals maintains a website with a mapping tool that includes PRTR data by location, monitoring data for air and water quality, and demographic data. Users can search by prefecture, substance, industry sector, and type of release. The site also includes a model to simulate the impact of a new source. It ranks based on facilities, releases, and air/water quality.[85] *(Please note that this website is in Japanese.)*

This PRTR data system was developed as a tool to utilize the PRTR data in environmental risk assessment at the regional level. It is intended to present the PRTR data in a form that is easily understood visually and to use that information to provide the public with the risk assessment results. The PRTR data are combined with other data, including monitoring data, meteorological data, socio/economic data and data on chemical toxicity, as well as emissions from other sources (e.g., mobile sources). These data are used as inputs into simulation models that calculate ambient air and water concentrations. The model simulations can then be overlaid with geographic and population data in a map of a particular region. The maps are accompanied by tables showing the numeric results.

The system, therefore, allows the estimation of concentrations due to releases of the PRTR substances from reporting facilities combined with estimated releases of other (non-point) sources. It can compare these estimates with actual monitoring sites and identify local municipalities with high concentrations and, further, can overlay this information on a map of population density. The system can also help search for the origins of pollution in a river system, for example, by comparing water quality monitoring results with releases from facilities located upstream of the monitoring sites.

The system also includes information on health and environmental effects for individual substances. For a particular facility the system will identify the releases and transfers by substance, use a model to forecast the atmospheric concentrations of air emissions, and present concentrations of the substances visually on a map as well as the health effects of each substance in a table accompanying the map.

A company can also use this system to predict what contribution to atmospheric pollution a new facility or new project at an existing facility might have. Current conditions are modeled and then the increased emissions are added to show two maps, before and after the proposed project.

4.3 The United Kingdom's Spotlight Report

The UK Environment Agency's *Spotlight 2002*[86] is the fifth annual report on business environmental performance. Based on environmental data, including PRTR data, that the Agency collects in the course of its activities to control pollution, the report presents a sector-by-sector analysis of businesses and industry in England and Wales. It highlights good and bad performers

and details the main prosecutions brought by the Agency over the year in a concise, 20-page report.

The report begins by highlighting "good performance." It presents the substances that have seen large reductions, and which industry sectors contributed to the reductions. For example, the chemicals industry is reported to have cut emissions of volatile organic compounds (VOCs) by 12 percent during the previous one-year period and by 20 percent the year before. The report then goes into detail about the chemicals industry and its contribution (30 percent of regulated volatile organic compound emissions in the UK) and lists three individual facilities that achieved substantial reductions in VOCs during the year.

The UK Environment Agency also assesses the "poor performers" in their *Spotlight Report*. They do this by ranking companies by the number of times they have been prosecuted by the Agency for environmental offenses and by those that received the highest fines for those offenses. The report lists the companies by number of fines levied and describes for many of them the incident that led to the prosecution.

The report presents this information on good performance to show that environmental standards can be met through both waste minimization efforts and clean-up technologies. The information on poor performance highlights the type of pollution and environmental impacts that result from management lapses and demonstrates to business the importance of protecting the environment. It enables the public to develop own views about business environmental performance.

4.4 Guide to Canada's National Pollutant Release Inventory

The non-governmental organization Canadian Institute for Environmental Law and Policy (CIELAP) has developed a variety of reports based on the Canadian PRTR data (NPRI). It's *Citizen's Guide to the National Pollutant Release Inventory*[87] helps readers understand what information can be found in the Canadian NPRI, how to access the NPRI and how to use NPRI data. It also gives examples of how others have used the NPRI. CIELAP has also created and distributed educational posters that show pollution hotspots and list top on-site releases and off-site transfers of pollutants by facilities across Canada in 2000, 1998, and 1996, using data from the NPRI.[88] The work of this organization aims to help the non-technical public learn about the existence of PRTR data, get the information and interpret it.

The *Citizen's Guide* describes who must report and what is reported, including details about what the different reporting thresholds are, which substances are reported and where information on health effects of the substances can be found. The Guide demonstrates how to obtain the data for a particular facility from the government website and, then, how to interpret it. The guide to interpretation of the data covers the many changes that have been made to the database and how to select data appropriate for comparisons between years and facilities.

Finally, the Guide provides examples of the wide range of local, regional, national and international uses for NPRI data. Examples include an analysis of a river basin spanning across international boundaries; and a map that graphically compares PRTR data for three cities in North America (in Canada, Mexico and the United States). This three-city map, as well as a national PRTR map, has been successfully used in classrooms to demonstrate the usefulness of NPRI data.

4.5 Environmental Defense Scorecard Website for US Data

The nonprofit organization Environmental Defense provides an information service website, *Scorecard*,[89] which features a variety of environmental pollutant information at the local level to allow users to locate and rank sources of pollution in their community. The Toxic Chemical Releases from Industrial Facilities Pollution Locator uses the PRTR data from the US TRI. Geographic areas can be searched and ranked by zip code, state, county, or facility. The website also provides information on health effects, regulatory controls, and how these data can be used in terms of social justice linked to the PRTR data.

The *Scorecard* site can rank on a particular environmental issue, such as health risks or environmental releases, for three levels of geographic area (state, county and postal code) or by facility. The website uses toxicity weights (toxicity weights based on a human health multimedia fate and transport model, the Human Toxicity Potential[90]) in its ranking of facility releases. Substances are divided into carcinogenic and non-carcinogenic, and releases are weighted and summed by facility for a ranking within a geographic area.

At the Scorecard website users can send free faxes to each state's top industrial releases (based on TRI data) expressing concern and a desire for increased pollution control measures. Telephone numbers are also provided for each of the top releases so website users can call with more personal voice messages.

Environmental Defense's Scorecard website also provides Environmental Justice analyses for each US state. These reports integrate information about pollution problems with census data to identify geographic areas or demographic groups that may be disparately affected by pollution. Four environmental burdens are examined: releases of toxic chemicals (using US TRI data), cancer risks from hazardous air pollutants, Superfund sites and emissions of criteria air pollutants. The analysis includes an environmental justice mapping tool; distributions of pollution burden by race/ethnicity, income, poverty, childhood poverty, education, job classification, and home ownership, locations of counties with unequal burden distributions and a comparison of state results to the nation as a whole.

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APPENDIX

This appendix has been provided to facilitate a quick Internet search of the presented uses of PRTR data and tools for their presentation.

Table 1 provides the presented tools and their short description.

Table 2 provides the presented uses of PRTR data and their short description grouped according to the use categories.

Table 3 provides the presented uses of PRTR data and their short description grouped according to the type of tool used.

APPENDIX: TABLE 1. TOOLS

Organization	Web Source	Description	Tool
LandView 6	http://www.census.gov/geo/landview/	Mapping tool that includes geographic boundaries, demographic statistics, and environmental data (including TRI data).	GIS Mapping
MapCruzin.com (Clary-Meuser Research Network)	http://www.mapcruzin.com/	Website provides mapping software along with TRI data. Can be downloaded or is available on CD.	GIS Mapping
World Bank, Development Research Group	http://www.worldbank.org/nipr/work_paper/risks/index.htm	Report comparing seven risk-weighted rankings under alternative measures of toxicity.	Toxicity Weighting
University of California at Berkeley	http://faculty.haas.berkeley.edu/toffel/papers/Weighting_Methodologies_Dec112002_JIE.doc	Study evaluating 13 toxicity weighting schemes that have been or could be used with U.S. TRI data.	Toxicity Weighting
Chemical Hazard Evaluation for Management Strategies (CHEMS)	http://www.aftresearch.org/researchresource/wp/sp98-1/ipmswan.htm	CHEMS, Chemical Hazard Evaluation for Management Strategies, is a chemical ranking and scoring system that provides a relative assessment of chemical hazards. It combines measures of chemical toxicity with chemical releases and information on environmental persistence and bioaccumulation.	Risk Screening
U.S. Environmental Protection Agency, Tool for the Reduction and Assessment of Chemical and Other Environmental Impacts	http://www.epa.gov/ORD/NRMRL/std/sab/download2.htm	TRACI, the Tool for the Reduction and Assessment of Chemical and Other Environmental Impacts, was developed to characterize the potential effects of chemical emissions and land, water, and fossil fuel use. It can be used as a tool in life cycle impact assessment, pollution prevention planning and sustainability metrics development in the U.S. Inputs for pollution prevention planning and sustainability metrics include PRTR data. Model can be downloaded.	Risk Screening
Bridges to Sustainability	http://www.bridgestos.org/	Models that use metrics based on PRTR data and productivity integrated with a set of explicit decision rules for a total costs assessment that compares, for example, different product lines or different facilities within a company.	Normalization
Canadian National Roundtable on Economy and the Environment (NRTEE)	http://www.nrtee-trnee.ca/Publications/Eco-efficiency_Workbook/en/introduction.htm	Workbook with methods for businesses to calculate energy, water, and waste eco-efficiency indicators. PRTR data used to calculate waste indicators.	Environmental Indicators
Environmental Australia, Public Environmental Reporting	http://www.ea.gov.au/industry/finance/per/index.html	Workbook demonstrating how corporations can measure and report to the public on the management of environmental risks associated with their operations.	Environmental Indicators

Organization	Web Source	Description	Tool
Global Reporting Initiative	http://www.globalreporting.org/	Corporate Sustainability Reporting Guidelines intended as a benchmark for public disclosure. Environmental Performance Indicators include emissions, effluents, and waste. Eco-efficiency ratios are also included. It is up to individual companies to make data public.	Environmental Indicators
Silicon Valley Environmental Partnership: Silicon Valley Environmental Index	http://www.svep.org/	Manual: How to Calculate Environmental Indicators. Describes where to get data for each indicator.	Environmental Indicators

APPENDIX: TABLE 2. EXAMPLES OF USES OF PRTR DATA BY CATEGORY OF USE

Use Category	Organization	Web Source	Description	Tool	Tool Used
PUBLIC					
USES BY THE PUBLIC- EDUCATION					
3.1.1	Citizens' Environmental Alliance of Southwestern Ontario	http://www.mnsi.net/~cea/	Annual reports summarizing Canadian PRTR data for local community. With 1999 data added U.S. PRTR data for community directly across the border.	2.1, 2.2	PRTR Data, Ranking
3.1.2	Environmental Defense: Scorecard	http://www.scorecard.org	Website with TRI and other data. Ranks by facility, state, county, postal code, health effects. Links to health effects information. Maps can locate a facility. Limitation: Multi-year data do not account for reporting changes, so trends are misleading.	1.3, 2.3, 2.4	GIS Mapping, Toxicity Weighting, Ranking
3.1.1	National Environmental Trust	http://environet.policy.net/relatives/4280.pdf	Report examining PRTR releases of chemicals that are of specific concern for child development, learning, and behavior. Examines selected substances that are classified as developmental and neurological toxins.	2.2	Ranking
3.1.1	Toxics Use Reduction Institute, TURA Data	http://www.turi.org/turadata/	Website with PRTR data for state of Massachusetts. Can search by municipality, company name, or chemical. Also has case studies of companies that have reduced use of toxic chemicals and of collaboration between companies and communities to reduce toxic use.	2.1	PRTR database
3.1.1	Toxwatch: Japanese PRTR data	http://www.toxwatch.net/	Only website with site specific PRTR data for Japan. Searches by facility, parent company, address, or postal code, or substance. Links to health effects information (http://env.safetyeng.bsk.ynu.ac.jp/ecochemi/)	2.1	PRTR database

USES BY THE PUBLIC – IMPROVEMENT OF FACILITY PERFORMANCE					
3.1.2	Ontario Clean Air Alliance	http://www.cleanair.web.net/resource/index.html	Studies using NPRI data to assess actions by industry (e.g., Fact Sheets on individual facilities). Includes recommendations for changes in industry programs.	2.2	Ranking
3.1.2	PollutionWatch	http://www.pollutionwatch.org/	Website that provides Canadian PRTR data plus health effects matrix. Ranks companies/facilities/municipalities by PRTR data categories. Retrieves data by postal code.	2.1-2.3, 2.5	PRTR Data, Ranking and GIS Mapping, Risk Screening
3.1.2	U.S. PIRG (Public Interest Research Group)	http://www.pirg.org//reports/enviro/track98/index.htm	An investigation into the "Responsible Care" Program of the US chemical industry. PRTR data were used to choose facilities with large releases and those facilities were called to see if Responsible Care member companies could and would answer basic questions about their operations.	2.1	PRTR Data

USES BY THE PUBLIC – IMPROVEMENT OF GOVERNMENT POLICIES					
3.1.3	Ontario Clean Air Alliance	http://www.cleanair.web.net/resource/index.html - reports	Studies using NPRI data to assess actions by government (e.g., "Up the Stack: Coal-fired Electricity's Toxic Impact"). Includes recommendations for changes in government programs.	2.2	Ranking
3.1.3	Silicon Valley Environmental Partnership	http://www.svep.org/	Toxic releases are one of about 20 indicators used to assess environmental trends. Trends are used to assess progress, identify priorities, and design actions for environmental improvement.	2.7	Environmental Indicators
3.1.3	U.S. PIRG (Public Interest Research Group)	http://pirg.org/reports/enviro/poison/	Report examining PRTR and municipal sewage treatment plant discharges to surface waters in the U.S. Maps by county; ranks by river, state, substance; includes compliance data.	2.2, 2.3	Ranking and GIS Mapping
USES BY THE PUBLIC – PARTNERSHIP WITH INDUSTRY					
3.1.4	Community Advisory Panels	http://www.americanchemistry.com/rc.nsf/ open?OpenForm	As an outgrowth of the Responsible Care program, Community Advisory Panels consist of a group of citizens and local industry personnel who meet on a regular basis to discuss issues and develop actions having to do with the operations and future plans of industry.	2.1	PRTR Data
3.1.4	Dow Chemical Company	http://www.dow.com/publicreport/2002/ assurance/cap.htm	Dow community advisory panels utilize information from Dow public reports, which contain PRTR data.	2.1	PRTR Data
3.1.4	Environmental Defense: Scorecard	http://www.scorecard.org/	Site will send a fax to facility and provides a telephone number.	2.1	PRTR Data
USES BY THE PUBLIC – PARTNERSHIP WITH GOVERNMENT					
3.1.5	Canadian Institute for Environmental Law and Policy	http://www.cielap.org/npri.html	The NPRI Guide describes one example of the use of a toxicity weighting scheme. This weighted analysis showed that the Montreal Urban Community's new sewage treatment plant was one of the worst polluters along this part of the St. Lawrence River. The finding was used as a basis for a report that urged action to improve Montreal's sewage treatment system by requiring industries that discharge into Montreal's sewers to pre-treat or eliminate their toxic discharges.	2.4	Toxicity Weighting
3.1.5	PollutionWatch	http://www.pollutionwatch.org	Site will send a fax or e-mail to facility or to Canadian Minister of the Environment.	2.1	PRTR Data
USES BY THE PUBLIC – ENVIRONMENTAL JUSTICE					
3.1.6, 3.5.1	British Columbia Institute of Technology	http://giswww1.bcit.ca/giscentre/projects2002.htm and http://giswww1.bcit.ca/projects2002/project7/index.htm	Student project (2002) to correlate location of facilities and minority residence (low income groups, ethnic minorities) in Vancouver, Calgary, and Edmonton. GIS model was developed as a student project.	2.3	GIS Mapping

3.1.6	Environmental Defense: Scorecard	http://www.scorecard.org/	Website presents TRI data by ethnicity, income, age, education level by state and county and compares to other jurisdictions.	2.1, 2.2	PRTR Data, Ranking
3.1.6	Environmental Justice Resource Center	http://www.ejrc.cau.edu/convent_report.html	Report examines "toxic burden" in St. James Parish, Louisiana, using PRTR per square mile, per person, and per job in relation to nation as a whole and state as a whole.	2.6	Normalization
3.1.6	Friends of the Earth, United Kingdom	http://www.foe.co.uk/campaigns/sustainable_development/pollution_and_poverty/	Two studies showing facilities more likely to be found in poorer communities. 1999 study related facilities in PRTR database to average household income of location. Only location and income. No statistical analysis or other factors (type and scale of industry, emissions, exposure, age, gender, ethnicity) were included. Acknowledges need for larger research effort. 2000 study focused on air emissions of carcinogens and made recommendations for changes in government activities.	2.2	Ranking
USES BY THE PUBLIC - ASSISTANCE TO OTHERS					
3.1.7, 3.1.5	The Access Initiative	http://www.accessinitiative.org/	CD-ROM Assessment Tool to help NGOs assess their government's commitment to public access to information and participation. Developed by global coalition of public interest groups collaborating to promote national-level implementation of commitments to access to information, participation, and justice in environmental decision-making. PRTR is one of key elements of public participation system in reporting and public disclosure of information about environmental performance and compliance by industrial facilities.	2.7	Environmental Indicators
3.1.7	Canadian Institute for Environmental Law and Policy	http://www.cielap.org/npri.html	Guide to NPRI (publication to help citizens use NPRI data).	2.1	PRTR Data
3.1.7	Right-to-Know Network (RTK NET)	http://www.rtknet.org/	Website with TRI and other data. Can search by facility, geographic area, industry sector, parent company and for off-site transfer sites. Can download results of search. Also has 10 other EPA databases (waste management, compliance, water permits, toxic substances test submissions).	2.1	PRTR Data
INDUSTRY					
USES BY INDUSTRY - POLLUTION PREVENTION AND REDUCTION					
3.2.1, 3.2.2	3M Company	http://www.3m.com/about3m/sustainability/?	Annual environmental progress report. Trends 1990-2001. Tallies amount of pollution prevented. Eco-efficiency matrix gives TRI releases/USD million sales for U.S. facilities.	2.1, 2.6	PRTR Data, Normalization

3.2.1	ICI Environmental Burden Approach	http://www.ici.com/icishe/2000/pages/past11.htm	PRTR data used as input to its weighting scheme (called Environmental Burden) for environmental management decision-making. Other data used include potency factors and emissions of other substances.	2.4	Toxicity Weighting
3.2.1	Romo Inc.	http://www.epa.gov/opptintr/dfe/pubs/screen/case_studies/case1/casestudy1.html	Romo Inc., a commercial screen printer, committed to reduction in use of toluene and methyl isobutyl ketone of 50% from 1992 to 1995 under the EPA 33/50 Program (a voluntary reduction program based on the PRTR reporting system). These chemicals were used as screen cleaning products. By changing to press-side screen cleaning products, following a review of ink remover products on the market, Romo reduced use of the chemicals by 70%.	2.1	PRTR Data
3.2.1, 3.2.2	Sharp Corporation	http://sharp-world.com/corporate/eco/report/index.html	Company program (Global Chemical Substances Management System) uses PRTR data to identify priority substances for reduction, set reduction targets, and measure reductions with PRTR data. Annual environmental report presents PRTR data for individual Japanese sites. Report presents costs of environmental protection and cost reduction from environmental protection measures.	2.1	PRTR Data
USES BY INDUSTRY - COST REDUCTION					
3.2.2	Environmental Management System at Acushnet Rubber Company	http://www.epa.gov/dfe/pubs/iems/bulletins/bullet01/index.html	Acushnet Rubber Company used PRTR data to develop and meet a specific goal of its Environmental Management System. Among the PRTR chemicals, Acushnet set a target for complete elimination of TCE for several reasons, including its hazardous waste disposal costs and TCE's toxicity rating (listed as potential carcinogen on IARC). Cost savings from elimination are estimated at USD100,000 annually.	2.4	Toxicity Weighting
3.2.2, 3.2.1	Matsushita Electric	http://www.matsushita.co.jp/environment/ 2002e/index.html	The company's "Environmental Sustainability Report 2002" details its environmental management system (ISO 14001) and the resulting "targets" (reduction goals and actions) in its "Green Plan 2010". Measurement data include costs and benefits of environmental conservation. PRTR data are used to measure progress against the targets and are given for each facility in Japan. PRTR data are also summarized by region (Japan, Americas, Europe, China, and Asia/Oceania).	2.1	PRTR Data
USES BY INDUSTRY - PUBLIC DISCLOSURE OF ENVIRONMENTAL DATA					
3.2.3	Ajinomoto	http://www.ajinomoto.com/environment/ index.html	This food and pharmaceutical company included PRTR information for its Japanese facilities in its 2002 Environmental Report as result of new law requiring PRTR Substances Control Information.	2.1	PRTR Data
3.2.3	Canadian Petroleum Products Institute	http://www.cppi.ca/espr.htm	Annual Environmental and Safety Performance Report (1996-2001). Summarizes NPRI data for member refineries by substance. Summarizes percent reduction by region. 2001 report shows trend since 1993.	2.1	PRTR Data

3.2.3	General Motors Corporation	http://www.gm.com/company/gmability/environment/annual_reports/index.html	Corporate Responsibility and Sustainability Report includes summary of NPRI and TRI data; data per vehicle produced; and, for each U.S. facility, number of employees, vehicles produced, description of operations, and TRI data for three years by type of release and pounds per vehicle produced and by substance. Can search for a facility by state on map of U.S.	2.1, 2.6	PRTR Data, Normalization
3.2.3	Perstorp	http://www.perstorp.se/pnet/ext/septp375.nsf/Environment	Swedish company produces annual Environment Report for all of its facilities worldwide. Includes current year and trend PRTR data along with greenhouse gases, energy use, water use.	2.1	PRTR Data
3.2.3	PG&E Corporation	http://www.pgecorp.com/news/environment/	2001 Environmental Report by this electric utility company presents TRI releases as pounds per megawatt-hour.	2.6	Normalization
3.2.3	Responsible Care	http://www.icca-chem.org/section02a.html http://www.ccpa.ca/ (Canada) http://www.americanchemistry.com/ (U.S.)	Begun in Canada and now established in 40 countries, a voluntary program of the chemical industry for open communication about its activities. Use of PRTR differs by country. U.S. will begin public reporting of TRI data in 2004. At beginning there was no public disclosure on company basis or outside verification of statements. Canada beginning to have verification reports online, U.S. program will publish TRI data in 2004.	2.1	PRTR Data
USES BY INDUSTRY - ASSISTANCE TO OTHERS					
3.2.4	Enviance and DuPont Corporation	http://www.enviance.com/Solutions/Regulatory/TRI.aspx	Partnership developed reporting software for the preparation of TRI reports by corporations. Allows evaluation and publication of TRI data on a corporate level.	2.1	PRTR Data
3.2.4	Noranda and Canada/Chile Partnership	http://www.conama.cl/chile-canada/h/presentaciones/PRTR Workshop - May 29 2002_noranda.ppt	At a workshop held by Council of the Canada-Chile Commission for Environmental Cooperation, Noranda demonstrated its use of PRTR data to track progress in environmental management.	2.1	PRTR Data
3.2.4	Northeast Business Environmental Network	http://www.nben.org	Network of companies that share information about pollution prevention, environmental compliance, and health and safety issues with member companies. The "Peer Assistance Program" match members with small and medium-sized businesses. Project to assist in development of Environmental Management Systems was the result of a grant from USEPA.	2.1	PRTR Data
GOVERNMENT					
USES BY GOVERNMENT – ENVIRONMENTAL IMPROVEMENTS					
3.3.1	33/50 Program	http://www.epa.gov/triinter/programs/other_federal.htm	USEPA initiative that targeted 17 TRI chemicals for reduction. Companies participated voluntarily, making public reduction commitments. Progress was calculated against the 1988 TRI baseline.	2.1	PRTR Data

3.3.1	Accelerated Reduction/ Elimination of Toxics (ARET) program	http://www.ec.gc.ca/nopp/aret/	ARET program, a government challenge program for voluntary reduction and elimination of releases of toxic substances. Criticism of the program included the fact that the baselines were not made public and PRTR data did not always show the progress claimed.	2.1	PRTR Data
3.3.1	Commission for Environmental Cooperation of North America, Taking Stock series	http://www.cec.org/Takingstock	Annual reports comparing PRTR data in U.S. and Canada present off-site transfers to sites between the two countries.	2.1	PRTR Data
3.3.1	Commission for Environmental Cooperation of North America, Taking Stock 1996	http://www.cec.org/pubs_docs/documents/index.cfm?varlan=english&ID=272	Report (Taking Stock 1996) comparing PRTR data in U.S. and Canada compared releases by geographic jurisdiction to population.	2.1	PRTR Data
3.3.1	Commission for Environmental Cooperation of North America, Taking Stock 2000	http://www.cec.org/pubs_docs/documents/index.cfm?varlan=english&ID=1146	Report (Taking Stock 2000) comparing PRTR data in U.S. and Canada presents PRTR data for facilities reporting smaller releases and transfers contrasted with group of facilities reporting largest releases and transfers.	2.1	PRTR Data
3.3.1	Environment Canada - Atlantic Region	http://www.ns.ec.gc.ca/epb/air_toxics/	For a program to measure the environmental risks associated with priority toxic substances in the region as well as selected substances of national concern, a version of the Chemical Hazard Evaluation for Management Strategies (CHEMS) ranking model was used to evaluate the risk to human health and the environment of NPRI pollutants released and transferred for disposal in the Atlantic Provinces. The CHEMS model is a first step in prioritizing substances for further evaluation. A higher level of quantitative analysis and expert investigation is required before final conclusions can be reached about the relative toxicity, risk, and impact of NPRI pollutants and control strategies developed for the highest risk substances.	2.5	Risk Screening

3.3.1	Environmental Performance Agreements	http://www.ec.gc.ca/ape-epe/	An agreement negotiated between government and specific industry sectors or individual companies for reduced pollution levels not necessarily related to laws and regulations. PRTR data can be used to evaluate performance against commitments in agreements for listed substances. Critiques of the policy include the possibility of concessions by government from existing regulations, little public involvement, and costly for government to negotiate (see http://www.cela.ca/toxics/CEN/EnvPerformanceAgreements.pdf).	2.1	PRTR Data
3.3.1, 3.3.2	Indonesia's Program for Pollution Control Evaluation and Rating (PROPER)	http://www.worldbank.org/nipr/work_paper/PROPER2.pdf	Performance rating of water polluters, with six months' notice before making rating public. Half those notified improved rating before public disclosure. Does not disclose raw data to public for first six months, but facilities use data to cut pollution. Last ratings were 1998 due to financial crisis; new ratings slated for 2003. This system being considered in other Asian countries.	2.2	Ranking
3.3.1	Public Environmental Reporting (PER) (Australia)	http://www.ea.gov.au/industry/finance/publications/framework/index.html	Australian government report on benefits and framework for voluntary public presentation of information by corporations. Actual reports are published by companies.	2.5	Environmental Indicators
3.3.1	State of Environment Report, British Columbia, Canada	http://wlapwww.gov.bc.ca/soerpt/soereporting.html	State of Environment Report (Environmental Trends in British Columbia 2002) includes variety of environmental indicators, including NPRI data on on-site releases 1993-2000. Discusses trends and reasons for change.	2.7	Environmental Indicators
3.3.1	United Kingdom's Spotlight on Business Performance	http://www.environment-agency.gov.uk/ commondata/105385/spt_2002full_523404.pdf	Annual assessment of good and poor environmental performance by businesses in England and Wales. The report covers nine business sectors (chemicals, construction, farming, fuel and power, metals, minerals, waste, water, and other businesses including retailers and general manufacturing) and their emissions, operator performance, waste production, pollution incidents, and prosecutions and fines over the previous year. The Pollution Inventory emissions data reported by each sector are compared with previous years of data to illustrate significant changes in emissions across the sector, and by individual sites to characterize "good and bad performers." Some of the sites demonstrating significant changes are used as case studies to illustrate good and bad practice. Uses PRTR data to identify good performers.	2.2	Ranking
3.3.1	United Nations Environment Programme	http://www.chem.unep.ch/pts/	Regional assessments of Persistent Toxic Substances: North America Regional Report, South East Asia and South Pacific Report, and Europe Regional Report used PRTR data to quantify sources. Report presents priorities for actions to reduce the substances. (Europe report used U.S. data for hexachlorobenzene.)	2.1	PRTR Data

USES BY GOVERNMENT – REGULATORY COMPLIANCE					
3.3.2	Massachusetts Office of Technical Assistance for Toxics Use Reduction	http://www.state.ma.us/ota	Office of state government that assists industrial facilities, municipalities, schools, hospitals, and households to reduce or eliminate their use of toxics and generation of hazardous waste. Case studies show use of Massachusetts TURA data to identify pollution prevention projects. TURA data include releases, transfers and use and system requires a pollution prevention plan.	2.1, 2.5	PRTR Data, Risk screening
3.3.2	U.S. Environmental Protection Agency, Brownfields Project	http://www.epa.gov/brownfields/html-doc/lv3.htm	This project describes the possible uses for LandView in assessing a site for redevelopment. The LandView mapping tool can assist in developing an inventory of potentially contaminated properties as well as existing facilities that may impact the environmental and economic feasibility of beneficial reuse options for a site. The census data provide demographic data such as population, household income, labor force participation, and educational attainment for the area.	2.3	GIS Mapping
3.3.2	U.S. Environmental Protection Agency, Office of Enforcement and Compliance Assurance: IDEA	http://www.epa.gov/Compliance/planning/ data/multimedia/idea/index.html	The Integrated Data for Enforcement Analysis (IDEA) system is a single-source of environmental performance data on regulated facilities within EPA. IDEA gives a historical profile of inspections, enforcement actions, penalties assessed, toxic chemicals releases and transfers (PRTR data), and hazardous spills.	2.1	PRTR Data
3.3.2	U.S. Environmental Protection Agency, Sector Facility Indexing Project	http://www.epa.gov/sfipmtn1/	Profiles of facilities within five industry sectors. Data include PRTR data, regulatory compliance data, demographic and production data. Rankings based on ratio of releases/production. PRTR data for all chemicals and for carcinogens/metals only. PRTR data not current. Compliance data more current and available elsewhere. Had intended to have toxicity weighting, but never implemented.	2.6	Normalization
USES BY GOVERNMENT - DEVELOPMENT OF POLICIES AND REGULATIONS					
3.3.3	Environment Canada Emergencies Section, British Columbia	E-mail communication from Environmental Protection Branch of the British Columbia office of Environment Canada	New CEPA regulations, Section 200, require companies to have an Environmental Emergency Plan for the prevention of, preparedness for, response to, and recovery from an environmental emergency for a listed substance. NPRI database used as one source for list of companies possibly covered by the regulation. Uses PRTR data to identify companies.	2.1	PRTR Data

3.3.3	Environmental Protection Branch, Environment Canada, British Columbia	E-mail communication from Environmental Protection Branch of the British Columbia office of Environment Canada	Laboratory analysis showed a deleterious substance that was feeding into a salmon bearing stream from a storm sewer and killing the fish. Searched NPRI database for facilities located in the city (Burnaby) and the substances released to find companies who could be source of the problem. Uses PRTR data to identify companies.	2.1	PRTR Data
3.3.3	U.S. Environmental Protection Agency, National Air Toxics Program	http://www.epa.gov/ttn/atw/urban/natprpt.pdf	PRTR data used in establishing the baseline for sources of hazardous air pollutants used in developing a national strategy for reducing emissions of air toxics and improving understanding of health risks posed by toxics in urban areas.	2.1	PRTR Data
3.3.3	U.S. Environmental Protection Agency, Contaminated Sediment Management Strategy	http://www.epa.gov/waterscience/cs/manage/stratndx.html	PRTR data used to assist in selecting chemicals for review under the National Sediment Quality Survey and Source Inventory.	2.1	PRTR Data
USES BY GOVERNMENT - PROGRAMME EVALUATION					
3.3.4	Commission for Environmental Cooperation of North America	http://www.cec.org/	Annual report comparing PRTR data in U.S. and Canada. Program to assist in development of PRTR in Mexico.	2.1	PRTR Data
3.3.4	Oregon Toxic Use and Hazardous Waste Reduction Law: 2002 Status Report	http://www.deq.state.or.us/wmc/tuwrap/ documents/TUR2002StatusRpt.pdf	The 1989 Act promotes pollution prevention planning for the reduction of both the use of toxic chemicals and the generation of hazardous waste. TRI facilities are subject to the planning requirements. One measure of "use reduction" is the change in the number of facilities reporting to TRI since reporting is based on "use" of the toxic chemical. TRI releases are also normalized by Gross State Product when assessing trends.	2.1, 2.6	PRTR Data, Normalization

3.3.4	United Kingdom Environment Agency, Corporate Scorecard	http://www.environment-agency.gov.uk/search/?lang=_e&searchfor=corporate+scorecard&any_all=all&region=&subject=	The Corporate Scorecard is a management system for the Environment Agency to measure its corporate performance in delivering the 17 key strategic short- and long-term goals detailed in the Corporate Strategy. The system sets quarterly and annual outcome measures for each goal, which include both environmental outcomes and Agency "corporate goals." Four of the strategic goals require PRTR data to measure progress: cleaner air for everyone (reduction in key pollutants from Agency regulated industrial processes); restored, protected land and healthier soils (reduction in air emissions to reduce the area of land where critical loads are exceeded); wiser, sustainable use of natural resources (reduction in waste produced by sites and across Agency regulated industrial sectors and increase in waste recovered or reused); and limitations on and adaptation to climate change (reduction in greenhouse gas emissions from Agency regulated processes).	2.1	PRTR Data
USES BY GOVERNMENT – RISK ASSESSMENT					
3.3.5	Japan Eco-Chemi	http://env.safetyeng.bsk.ynu.ac.jp/ecochemi/	Mapping tool that includes PRTR data by location, monitoring data for air and water quality, and demographic data. Searches by prefecture, substance, industry sector, and type of release. Model to simulate impact of a new source. Will rank on facilities, releases, air/water quality.	2.2	Ranking
3.3.5	New York State Department of Health: Cancer Surveillance Improvement Initiative	http://www.health.state.ny.us/nysdoh/cancer/sublevel/infobull.htm	An interdisciplinary team is investigating unusual disease patterns in the state. The unusual disease pattern protocol includes identification of postal codes where unusually high rates of cancer have been identified and compilation of existing environmental data (including TRI data) for the postal codes. A GIS will aid in conducting an exposure evaluation of the areas. The study aims to increase understanding of factors that cause cancer in New York State and of opportunities to reduce or eliminate the exposures.	2.3, 2.5	GIS Mapping, Risk Screening
3.3.5	U.S. Environmental Protection Agency, Risk-Screening Environmental Indicators Model	http://www.epa.gov/opptintr/rsei/index.html	Computer-based model that permits screening-level analyses. Users can relate amounts of chemical releases and transfers to estimate the hazard and risk-related impacts (toxicity, exposure level, exposed population) associated with each reporting facility, relative to one another.	2.4, 2.5, 2.7	Toxicity Weighting, Risk Screening, Environmental Indicators

USES BY GOVERNMENT - EDUCATION					
3.3.6	Australia's National Pollutant Inventory	http://www.npi.gov.au/	Data on amount of substances released annually to air, water, and land. Searches by facility, substance, industry/other sources, geographic location. Includes aggregated data for sources other than large industrial ones. Can search for data by airshed and water catchments.	2.1	PRTR database website
3.3.6	Canada's National Pollutant Release Inventory (NPRI)	http://www.ec.gc.ca/pdb/npri/	Data on total amount of pollutants released annually to air, water, land and amounts transferred off-site from major industrial sites in Canada. Searches by facility, substance, postal code, name of community, industry sector code. Provides data on criteria air contaminants from diverse sources for geographic searches. Also includes criteria air contaminants (1995 data) summarized by source category by substance for geographic area.	2.1	PRTR database website
3.3.6	European Pollutant Emission Register (EPER): Central Data Repository	http://cdr.eionet.eu.int/	Member countries of the European Commission are required to report emissions (air and water) information from industries on a list of 50 pollutants every 3 years (2001 as reported in 2003 was first year). EPER and other reports by country.	2.1	PRTR database
3.3.6	Ireland Pollutant Emissions Register (PER)	http://www.epa.ie/licences/ipc.htm	Annual Environmental Report required for permitted facilities includes mass balance for substances. Available to public, but not available on Internet. Air and water emissions have been submitted to EPER.	2.1	PRTR database
3.3.6	Japan PRTR	MOE: http://www.env.go.jp/chemi/prtr/risk0.html and http://www.prtr-info.jp/ METI: http://www.meti.go.jp/policy/chemical_management/law/prtr/index.html NITE: http://www.prtr.nite.go.jp/index-e.html	Ministry of the Environment (MOE), Ministry of Economy, Trade and Industry (METI) and National Institute of Technology and Evaluation (NITE) websites. Summarize PRTR data and information on the reporting system.	2.1	PRTR database
3.3.6	Netherlands Emission Inventory System	http://www.mep.tno.nl/	Data on air, water, and waste from large industrial facilities. Collective Emissions Inventory includes general survey of emissions from smaller companies and diffuse sources. Database maintained by TNO-MEP (independent research institution).	2.1	PRTR database
3.3.6	Norwegian Pollutant Release and Transfer Register (INKOSYS)	In English: http://www.sft.no/bmi/Main/english.asp In Norwegian: http://www.sft.no/bmi/	Annual emissions to air and water of regulated substances by facilities with discharge permits. Used by government for compliance assurance and in State of the Environment reports. PRTR data and permits, permissible pollutant production volumes, types of waste generated, energy consumption are on Internet and can be retrieved by company name or map search.	2.1	PRTR database website

3.3.6	Sweden's Pollutant Release and Transfer Register (PRTR)	http://www.naturvardsverket.se/prtr	Data on air, water, waste, and product from large industrial facilities for 70 substances or groups of substances. First reporting year 2001. Can search by facility, substance, county/city, industry sector.	2.1	PRTR database website
3.3.6	United Kingdom's Pollution Inventory (PI)	http://www.environment-agency.gov.uk/pi	Data on total amount of pollutants released annually to air, water, and sewers from major industrial sites in England and Wales. Environmental improvements made to industrial sites. Does not include amount of substance in transfers. Maps location of facility and shows other sites (landfills, river quality monitoring sites, groundwater source protection zones, flood plains).	2.1, 2.2, 2.3	PRTR database website
3.3.6	U.S. Toxics Release Inventory: TRI Explorer	http://www.epa.gov/triexplorer/	Data on total amount of substances released annually to air, water, land and amounts transferred off-site from major industrial sites in U.S. Searches by substance, geographic division, industry sector code. Includes 1988-2001 data.	2.1	PRTR database website
3.3.6	U.S. Toxics Release Inventory: Window to My Environment	http://www.epa.gov/enviro/wme/	Searches by postal code or city produce a map with TRI facilities and other regulated sites (hazardous waste, water dischargers). Can obtain reported amounts of substances. Includes 1987-2001 data.	2.1	PRTR database website
USES BY GOVERNMENT – REGIONAL AND INTERNATIONAL OBLIGATIONS					
3.3.7	European Pollutant Emission Register (EPER)	http://europa.eu.int/comm/environment/ ippc/eper/	Member countries of the European Commission are required to report emissions (air and water) information from industries on a list of 50 pollutants every 3 years (2001 as reported in 2003 was first year).	2.1	PRTR database
3.3.7	International Programme on Chemical Safety: Concise International Chemical Assessment Documents (CICADs)	http://www.who.int/pcs/ra_site/cicads.htm	Concise International Chemical Assessment Documents (CICADs) are risk assessment documents for individual chemicals produced by a cooperative program of the World Health Organization (WHO), the International Labour Organization (ILO), and the United Nations Environmental Programme (UNEP). The documents provide summaries of potential human health and environmental effects of the chemicals. PRTR data (from countries with PRTR data) are included in the section on anthropogenic sources of human and environmental exposure.	2.1	PRTR data
3.3.7	United Kingdom Environment Agency	E-mail communication from Pollution Inventory Team, Environment Agency, United Kingdom: http://www.environment-agency.gov.uk/	PRTR data were used to provide an assessment of the relative importance of industrial sectors regulated by the Environment Agency as contributors to emissions of the European Union's Water Framework Directive substances to water and air. The major/minor/negligible source distinction will be a main criterion to be taken into account when deciding whether sources/substances control measures should be developed and proposed at European Union level or national level.	2.1	PRTR data

INVESTMENT COMMUNITY					
USES BY INVESTMENT COMMUNITY – ASSESSING ENVIRONMENTAL PERFORMANCE OF COMPANIES					
3.4.1, 3.4.2	EIRIS (Ethical Investment Research Service)	http://www.eiris.org/	Provides investors, institutions, and fund indexes with company ratings based on environmental data, including PRTR data.	2.1	PRTR data
3.4.1	FTSE4Good Index	http://www.ftse.com/ftse4good/criteria_methodology.jsp	Fund classifies company's environmental impact (low, medium, high) based on industry sector and sector's PRTR data, among other environmental data. Covers U.S., Global, UK, and Europe markets. PRTR data for a company is one screening criterion.	2.1	PRTR data
3.4.1, 3.4.2	Investor Responsibility Research Center	http://www.irrc.org/prod_serv/products_environmental.htm	Maintains a "Corporate Environmental Profiles Database" for portfolio screening. Uses TRI data among other USEPA databases. Creates indices for companies and industry sectors.	2.6	Normalization
USES BY INVESTMENT COMMUNITY – TRACKING ENVIRONMENTAL PERFORMANCE OF COMPANIES					
3.4.2	Commission for Environmental Cooperation of North America	http://www.cec.org/pubs_docs/documents/index.cfm?varlan=english&ID=1170	Meeting on Finance and the Environment: Transparency, Disclosure, and Environmental Reporting. Discusses use of PRTR data in investment community.	2.1	PRTR data
3.4.2	Dow Jones Sustainability Indexes	http://www.sustainability-index.com	Companies are ranked within their industry based on a standard questionnaire. Questionnaire includes environmental performance—trend in total waste generation, % waste disposed in landfill, how frequently are data collected, does company maintain centralized database. Both worldwide and European Indexes. Minimal PRTR data.	2.2	Ranking
3.4.2	Groupe Investissement Responsable	http://www.investissementresponsable.com/	Provides investors with industry analyses that offer a detailed look at the opportunities in relation to environmental performance. Will use NPRI data in report on the Canadian Oil and Gas and Forest products sectors.	2.1	PRTR data

ACADEMIC/INDEPENDENT RESEARCH INSTITUTIONS					
USES BY ACADEMIC RESEARCH INSTITUTIONS – BASIC RESEARCH					
3.5.1	Australian Journal of Political Science	http://www.ingenta.com/isis/searching/ExpandSearch/ingenta;jsessionid=16ccgmd3obrn9?title=%22australian+National+Pollutant+Inventory%22&title_type=tka&date_type=range&year_from=1997&year_to=2003&database=1&pageStart=1&index=2	The Australian National Pollutant Inventory (NPI) is designed to generate political and economic incentives for industry to move toward cleaner production. It enables community groups to put pressure on polluters and provides an opportunity for firms to identify inefficiencies. The inventory is built upon several liberal-democratic premises regarding the power of knowledge, the right to know, the effectiveness of pressure groups, and the ability of government to correct market failures. This paper analyzes the NPI using the U.S. TRI as a benchmark for comparison. Journal Article: M. Howes. 2001. What's your poison? The Australian National Pollutant Inventory versus the U.S. Toxics Release Inventory. Australian Journal of Political Science. 36(3):529-552.	2.1	PRTR data
3.5.1	Commission for Environmental Cooperation of North America	http://www.cec.org/pubs_docs/documents/index.cfm?varlan=english&ID=940	Workshop on Exploring Pollutant Release and Transfer Data in North America: Experience and Future Opportunities in the Academic Community. Summarizes academic research in Canada, Mexico, and U.S. using PRTR data.	2.1	PRTR data
3.5.1	Kanto Gakuin University, Japan and Trent University, Canada	http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B6V74-43C5C63-C&_user=10&_handle=W-WA-A-A-VD-MsSAYZA-UUW-AUZVCYABCY-CYVEBVV-VD-U&_fmt=summary&_coverDate=08%2F31%2F2001&_rdoc=11&_orig=browse&_srch=%23toc%235832%232001%23999559995%23254101!	The European Union System for Evaluation of Substances (EUSES) and the ChemCAN chemical fate model are applied to describe the fate of 68 chemicals on two spatial scales in Japan. Emission information on the chemicals has been obtained from Japan's Pollutant Release and Transfer Registry and available monitoring data gathered from government reports. Journal Article: K. Kawamoto, M. MacLeod, D. MacKay. 2001. Evaluation and comparison of multimedia mass balance models of chemical fate: application of EUSES and ChemCAN to 68 chemicals in Japan. Chemosphere. 44(4):599-612. Journal article authors: kawamoto@kanto-gakuin.ac.jp, mmacleod@trentu.ca.	2.5	Risk Screening
3.5.1	Political Economy Research Institute (PERI), University of Massachusetts, USA	http://www.umass.edu/peri/pdfs/WP18.pdf and http://www.umass.edu/peri/pdfs/WP50.pdf	Application of EPA RSEI tool: studies of whether risk from airborne chemical emissions is associated with race, ethnicity, and socioeconomic class.	2.7	Environmental Indicators
3.5.1	Political Economy Research Institute (PERI)	http://www.umass.edu/peri/pdfs/WP12.pdf	"Defending the Public Domain: Pollution, Subsidies, and Poverty" report calculates a "pollution subsidy" as the costs that manufacturers avoid by spending less than the national average per pound of toxic pollution times the total pounds released in a state.	2.6	Normalization

3.5.1	The Rose Foundation	http://www.rosefdn.org/efp.html	Environmental Fiduciary Project. Describes studies indicating that companies that perform better environmentally also tend to produce better financial results.	2.1	PRTR Data
3.5.1	University of British Columbia	http://www.ingenta.com/isis/searching/ExpandSearch/ingenta;jsessionid=1eb8vfj3l8hr2?author=antweiler&journal=canadian+journal+of+economics&journal_type=words&date_type=range&year_from=1997&year_to=2003&database=1&pageStart=1&index=1	Tests the prediction that "environmentally-leveraged" firms with consumer market exposure experience larger emission reductions. Uses 1993–99 panel data from Canada's National Pollutant Release Inventory (NPRI), with pollutants adjusted for toxicity. Journal Article: W. Antweiler and K. Harrison. 2003. Toxic release inventories and green consumerism: empirical evidence from Canada. Canadian Journal of Economics. 36(2):495-520(26).	2.4	Toxicity Weighting
3.5.1	University of California Riverside, Department of Economics, Riverside California, USA	http://www.economics.ucr.edu/seminars/1_8_03.pdf	Study of causes of relocation of firms from the U.S. to Mexico using PRTR data to identify companies and measure their change in waste generation before and after NAFTA.	2.6	Normalization
3.5.1	University of Trent, Peterborough, Ontario, Canada	mmacleod@tremtu.ca	Applications of contaminant fate model (BETR North America) that calculates air concentrations of a substance in ecological regions of North America that result from emissions from PRTR identified sources and population-based diffuse sources.	2.3	GIS Mapping
3.5.1	Water Quality Research Journal of Canada	http://www4.infotrieve.com/search/databases/detailsNew.asp?artID=10311882	A large-scale study on bisphenol A (BPA) contamination in Canadian municipal and industrial wastewater and sludge has been completed. Based on these data, on-site releases of BPA by industrial facilities seem to be much more widespread than the National Pollutant Release Inventory (NPRI) database has suggested. Journal Article: HB. Lee and T.E. Peart. 2000. Bisphenol A contamination in Canadian municipal and industrial wastewater and sludge samples. Water Quality Research Journal of Canada 35(2):283-298.	2.1	PRTR Data
USES BY ACADEMIC RESEARCH INSTITUTIONS – USE IN CLASSROOMS					
3.5.2	Canadian Institute for Environmental Law and Policy	http://www.cielap.org/npri.html	Maps and Teaching Guide (for elementary and high schools) to using NPRI data.	2.1	PRTR Data

3.5.2	Pembina Institute for Appropriate Development, Ottawa, Canada	http://www.pembina.org	Classroom demonstrations of websites with PRTR data. Limitation is that databases do not cover education and research institutions.	2.1	PRTR Data
3.5.2	PollutionWatch	http://www.pollutionwatch.org/tools/teachModule.jsp	Classroom guide to maps showing NPRI data. Not specific enough for teachers; needs to reference particular lessons, but this is difficult since lessons differ from school to school.	2.3	GIS Mapping
3.5.2	Toxics Use Reduction Institute	http://www.turi.org/education/index.htm#TURPlan	Course offered to business on toxics use reduction planning. Toxics use reduction plans are required under the Massachusetts PRTR system.	2.1	PRTR Data
USES BY ACADEMIC RESEARCH INSTITUTIONS – APPLIED RESEARCH					
3.5.3	Ireland EPA and Clean Technology Centre	http://www.epa.ie/r_d/downloads/publications/phase 1/mediumscale/MS-10-M1_for_web.pdf	Report on Environmental Benchmarking for IPC Industries surveyed use of PRTR data (includes releases, amounts in waste and in product) as indicator of performance and to improve business performance. Study found that international companies more likely to use than Irish companies.	2.7	Environmental Indicators
3.5.3	TNO-MEP (TNO Environment, Energy and Process Innovation), Department Emission Assessment	http://www.mep.tno.nl/	This organization maintains Netherlands PRTR database. Reports are done for national, regional, and municipal governments; industry; and trade associations using PRTR data. Data are used to assess the effects of environmental policy, to ascertain trends, and to supply data for modeling studies.	2.1	PRTR Data
3.5.3	Toxics Use Reduction Institute: Toxics Use Reduction Networking (TURN) Grant Program	http://www.turi.org/HTMLSrc/Communities.html	The Toxics Use Reduction Institute awards grants to community and environmental organizations and local governments to raise awareness and work on reducing toxic chemical use. One example was a regional workshop on toxics use reduction based on data submitted by local businesses on toxics usage. The workshop provides an overview of the PRTR data, alternatives to toxics use, pollution prevention opportunities, and resources available from state agencies. Institute works with the Massachusetts Office of Technical Assistance. Massachusetts PRTR database includes data on toxics use.	2.1	PRTR Data

APPENDIX: TABLE 3. USES OF PRTR DATA BY TYPE OF TOOL USED

Use Category	Organization	Web Source	Description	Tool	Tool Used
TOOL: PRESENTATION OF THE MERE PRTR DATA					
3.1.1	Citizens' Environmental Alliance of Southwestern Ontario	http://www.mnsi.net/~cea/	Annual reports summarizing Canadian PRTR data for local community. With 1999 data added U.S. PRTR data for community directly across the border.	2.1, 2.2	PRTR Data, Ranking
3.1.1	Toxics Use Reduction Institute, TURA Data	http://www.turi.org/turadata/	Website with PRTR data for state of Massachusetts. Can search by municipality, company name, or chemical. Also has case studies of companies that have reduced use of toxic chemicals and of collaboration between companies and communities to reduce toxic use.	2.1	PRTR database
3.1.1	Toxwatch: Japanese PRTR data	http://www.toxwatch.net/	Only website with site specific PRTR data for Japan. Searches by facility, parent company, address, or postal code, or substance. Links to health effects information (http://env.safetyeng.bsk.ynu.ac.jp/ecochemi/)	2.1	PRTR database
3.1.2	PollutionWatch	http://www.pollutionwatch.org/	Website that provides Canadian PRTR data plus health effects matrix. Ranks companies/facilities/municipalities by PRTR data categories. Retrieves data by postal code.	2.1, 2.2, 2.3, 2.5	PRTR Data, Ranking and GIS Mapping, Risk Screening
3.1.2	U.S. PIRG (Public Interest Research Group)	http://www.pirg.org//reports/enviro /track98/index.htm	An investigation into the "Responsible Care" Program of the US chemical industry. PRTR data were used to choose facilities with large releases and those facilities were called to see if Responsible Care member companies could and would answer basic questions about their operations.	2.1	PRTR Data
3.1.4	Community Advisory Panels	http://www.americanchemistry.com /rc.nsf/ open?OpenForm	As an outgrowth of the Responsible Care program, Community Advisory Panels consist of a group of citizens and local industry personnel who meet on a regular basis to discuss issues and develop actions having to do with the operations and future plans of industry.	2.1	PRTR Data
3.1.4	Dow Chemical Company	http://www.dow.com/publicreport/ 2002/ assurance/cap.htm	Dow community advisory panels utilize information from Dow public reports, which contain PRTR data.	2.1	PRTR Data
3.1.4	Environmental Defense: Scorecard	http://www.scorecard.org/	Site will send a fax to facility and provides a telephone number.	2.1	PRTR Data
3.1.5	PollutionWatch	http://www.pollutionwatch.org	Site will send a fax or e-mail to facility or to Canadian Minister of the Environment.	2.1	PRTR Data

Use Category	Organization	Web Source	Description	Tool	Tool Used
3.1.6	Environmental Defense: Scorecard	http://www.scorecard.org/	Website presents TRI data by ethnicity, income, age, education level by state and county and compares to other jurisdictions.	2.1, 2.2	PRTR Data, Ranking
3.1.7	Canadian Institute for Environmental Law and Policy	http://www.cielap.org/npri.html	Guide to NPRI (publication to help citizens use NPRI data).	2.1	PRTR Data
3.1.7	Right-to-Know Network (RTK NET)	http://www.rtknet.org/	Website with TRI and other data. Can search by facility, geographic area, industry sector, parent company and for off-site transfer sites. Can download results of search. Also has 10 other EPA databases (waste management, compliance, water permits, toxic substances test submissions).	2.1	PRTR Data
3.2.1	Romo Inc.	http://www.epa.gov/opptintr/dfe/pubs/ screen/case_studies/case1/casestudy1.html	Romo Inc., a commercial screen printer, committed to reduction in use of toluene and methyl isobutyl ketone of 50% from 1992 to 1995 under the EPA 33/50 Program (a voluntary reduction program based on the PRTR reporting system). These chemicals were used as screen cleaning products. By changing to press-side screen cleaning products, following a review of ink remover products on the market, Romo reduced use of the chemicals by 70%.	2.1	PRTR Data
3.2.1, 3.2.2	3M Company	http://www.3m.com/about3m/sustainability/?	Annual environmental progress report. Trends 1990-2001. Tallies amount of pollution prevented. Eco-efficiency matrix gives TRI releases/USD million sales for U.S. facilities.	2.1, 2.6	PRTR Data, Normalization
3.2.1, 3.2.2	Sharp Corporation	http://sharp-world.com/corporate/eco/ report/index.html	Company program (Global Chemical Substances Management System) uses PRTR data to identify priority substances for reduction, set reduction targets, and measure reductions with PRTR data. Annual environmental report presents PRTR data for individual Japanese sites. Report presents costs of environmental protection and cost reduction from environmental protection measures.	2.1	PRTR Data
3.2.1, 3.2.2	Matsushita Electric	http://www.matsushita.co.jp/environment/ 2002e/index.html	The company's "Environmental Sustainability Report 2002" details its environmental management system (ISO 14001) and the resulting "targets" (reduction goals and actions) in its "Green Plan 2010". Measurement data include costs and benefits of environmental conservation. PRTR data are used to measure progress against the targets and are given for each facility in Japan. PRTR data are also summarized by region (Japan, Americas, Europe, China, and Asia/Oceania).	2.1	PRTR Data
3.2.3	Ajinomoto	http://www.ajinomoto.com/environment/ index.html	This food and pharmaceutical company included PRTR information for its Japanese facilities in its 2002 Environmental Report as result of new law requiring PRTR Substances Control Information.	2.1	PRTR Data

Use Category	Organization	Web Source	Description	Tool	Tool Used
3.2.3	Canadian Petroleum Products Institute	http://www.cppi.ca/espr.htm	Annual Environmental and Safety Performance Report (1996-2001). Summarizes NPRI data for member refineries by substance. Summarizes percent reduction by region. 2001 report shows trend since 1993.	2.1	PRTR Data
3.2.3	General Motors Corporation	http://www.gm.com/company/gmability/ environment/annual_reports/index.html	Corporate Responsibility and Sustainability Report includes summary of NPRI and TRI data; data per vehicle produced; and, for each U.S. facility, number of employees, vehicles produced, description of operations, and TRI data for three years by type of release and pounds per vehicle produced and by substance. Can search for a facility by state on map of U.S.	2.1, 2.6	PRTR Data, Normalization
3.2.3	Perstorp	http://www.perstorp.se/pnet/ext/septp375.nsf/Environment	Swedish company produces annual Environment Report for all of its facilities worldwide. Includes current year and trend PRTR data along with greenhouse gases, energy use, water use.	2.1	PRTR Data
3.2.3	Responsible Care	http://www.icca-chem.org/section02a.html http://www.ccpa.ca/ (Canada) http://www.americanchemistry.com/ (U.S.)	Begun in Canada and now established in 40 countries, a voluntary program of the chemical industry for open communication about its activities. Use of PRTR differs by country. U.S. will begin public reporting of TRI data in 2004. At beginning there was no public disclosure on company basis or outside verification of statements. Canada beginning to have verification reports online, U.S. program will publish TRI data in 2004.	2.1	PRTR Data
3.2.4	Enviance and DuPont Corporation	http://www.enviance.com/Solutions/ Regulatory/TRI.aspx	Partnership developed reporting software for the preparation of TRI reports by corporations. Allows evaluation and publication of TRI data on a corporate level.	2.1	PRTR Data
3.2.4	Noranda and Canada/Chile Partnership	http://www.conama.cl/chile-canada/h/presentaciones/PRTR Workshop - May 29 2002_noranda.ppt	At a workshop held by Council of the Canada-Chile Commission for Environmental Cooperation, Noranda demonstrated its use of PRTR data to track progress in environmental management.	2.1	PRTR Data
3.2.4	Northeast Business Environmental Network	http://www.nben.org	Network of companies that share information about pollution prevention, environmental compliance, and health and safety issues with member companies. The “Peer Assistance Program” match members with small and medium-sized businesses. Project to assist in development of Environmental Management Systems was the result of a grant from USEPA.	2.1	PRTR Data
3.3.1	33/50 Program	http://www.epa.gov/triinter/programs/ other_federal.htm	USEPA initiative that targeted 17 TRI chemicals for reduction. Companies participated voluntarily, making public reduction commitments. Progress was calculated against the 1988 TRI baseline.	2.1	PRTR Data

Use Category	Organization	Web Source	Description	Tool	Tool Used
3.3.1	Accelerated Reduction/ Elimination of Toxics (ARET) program	http://www.ec.gc.ca/nopp/aret/	ARET program, a government challenge program for voluntary reduction and elimination of releases of toxic substances. Criticism of the program included the fact that the baselines were not made public and PRTR data did not always show the progress claimed.	2.1	PRTR Data
3.3.1	Commission for Environmental Cooperation of North America, Taking Stock series	http://www.cec.org/Takingstock	Annual reports comparing PRTR data in U.S. and Canada present off-site transfers to sites between the two countries.	2.1	PRTR Data
3.3.1	Commission for Environmental Cooperation of North America, Taking Stock 1996	http://www.cec.org/pubs_docs/documents/index.cfm?varlan=english&ID=272	Report (Taking Stock 1996) comparing PRTR data in U.S. and Canada compared releases by geographic jurisdiction to population.	2.1	PRTR Data
3.3.1	Commission for Environmental Cooperation of North America, Taking Stock 2000	http://www.cec.org/pubs_docs/documents/index.cfm?varlan=english&ID=1146	Report (Taking Stock 2000) comparing PRTR data in U.S. and Canada presents PRTR data for facilities reporting smaller releases and transfers contrasted with group of facilities reporting largest releases and transfers.	2.1	PRTR Data
3.3.1	Environmental Performance Agreements	http://www.ec.gc.ca/ape-epe/	An agreement negotiated between government and specific industry sectors or individual companies for reduced pollution levels not necessarily related to laws and regulations. PRTR data can be used to evaluate performance against commitments in agreements for listed substances. Critiques of the policy include the possibility of concessions by government from existing regulations, little public involvement, and costly for government to negotiate (see http://www.cela.ca/toxics/CEN/EnvPerformanceAgreements.pdf).	2.1	PRTR Data
3.3.1	United Nations Environment Programme	http://www.chem.unep.ch/pts/	Regional assessments of Persistent Toxic Substances: North America Regional Report, South East Asia and South Pacific Report, and Europe Regional Report used PRTR data to quantify sources. Report presents priorities for actions to reduce the substances. (Europe report used U.S. data for hexachlorobenzene.)	2.1	PRTR Data

Use Category	Organization	Web Source	Description	Tool	Tool Used
3.3.2	Massachusetts Office of Technical Assistance for Toxics Use Reduction	http://www.state.ma.us/ota	Office of state government that assists industrial facilities, municipalities, schools, hospitals, and households to reduce or eliminate their use of toxics and generation of hazardous waste. Case studies show use of Massachusetts TURA data to identify pollution prevention projects. TURA data include releases, transfers and use and system requires a pollution prevention plan.	2.1, 2.5	PRTR Data, Risk screening
3.3.2	U.S. Environmental Protection Agency, Office of Enforcement and Compliance Assurance: IDEA	http://www.epa.gov/Compliance/planning/ data/multimedia/idea/index.html	The Integrated Data for Enforcement Analysis (IDEA) system is a single-source of environmental performance data on regulated facilities within EPA. IDEA gives a historical profile of inspections, enforcement actions, penalties assessed, toxic chemicals releases and transfers (PRTR data), and hazardous spills.	2.1	PRTR Data
3.3.3	Environment Canada Emergencies Section, British Columbia	E-mail communication from Environmental Protection Branch of the British Columbia office of Environment Canada	New CEPA regulations, Section 200, require companies to have an Environmental Emergency Plan for the prevention of, preparedness for, response to, and recovery from an environmental emergency for a listed substance. NPRI database used as one source for list of companies possibly covered by the regulation. Uses PRTR data to identify companies.	2.1	PRTR Data
3.3.3	Environmental Protection Branch, Environment Canada, British Columbia	E-mail communication from Environmental Protection Branch of the British Columbia office of Environment Canada	Laboratory analysis showed a deleterious substance that was feeding into a salmon bearing stream from a storm sewer and killing the fish. Searched NPRI database for facilities located in the city (Burnaby) and the substances released to find companies who could be source of the problem. Uses PRTR data to identify companies.	2.1	PRTR Data
3.3.3	U.S. Environmental Protection Agency, Contaminated Sediment Management Strategy	http://www.epa.gov/waterscience/cs/ manage/stratndx.html	PRTR data used to assist in selecting chemicals for review under the National Sediment Quality Survey and Source Inventory.	2.1	PRTR Data
3.3.3	U.S. Environmental Protection Agency, National Air Toxics Program	http://www.epa.gov/ttn/atw/urban/ natprpt.pdf	PRTR data used in establishing the baseline for sources of hazardous air pollutants used in developing a national strategy for reducing emissions of air toxics and improving understanding of health risks posed by toxics in urban areas.	2.1	PRTR Data
3.3.4	Commission for Environmental Cooperation of North America	http://www.cec.org/	Annual report comparing PRTR data in U.S. and Canada. Program to assist in development of PRTR in Mexico.	2.1	PRTR Data

Use Category	Organization	Web Source	Description	Tool	Tool Used
3.3.4	Oregon Toxic Use and Hazardous Waste Reduction Law: 2002 Status Report	http://www.deq.state.or.us/wmc/tuwrap/documents/TUR2002StatusRpt.pdf	The 1989 Act promotes pollution prevention planning for the reduction of both the use of toxic chemicals and the generation of hazardous waste. TRI facilities are subject to the planning requirements. One measure of "use reduction" is the change in the number of facilities reporting to TRI since reporting is based on "use" of the toxic chemical. TRI releases are also normalized by Gross State Product when assessing trends.	2.1, 2.6	PRTR Data, Normalization
3.3.4	United Kingdom Environment Agency, Corporate Scorecard	http://www.environment-agency.gov.uk/search/?lang=_e&searchfor=corporate+scorecard&any_all=all&region=&subject=	The Corporate Scorecard is a management system for the Environment Agency to measure its corporate performance in delivering the 17 key strategic short- and long-term goals detailed in the Corporate Strategy. The system sets quarterly and annual outcome measures for each goal, which include both environmental outcomes and Agency "corporate goals." Four of the strategic goals require PRTR data to measure progress: cleaner air for everyone (reduction in key pollutants from Agency regulated industrial processes); restored, protected land and healthier soils (reduction in air emissions to reduce the area of land where critical loads are exceeded); wiser, sustainable use of natural resources (reduction in waste produced by sites and across Agency regulated industrial sectors and increase in waste recovered or reused); and limitations on and adaptation to climate change (reduction in greenhouse gas emissions from Agency regulated processes).	2.1	PRTR Data
3.3.6	Australia's National Pollutant Inventory	http://www.npi.gov.au/	Data on amount of substances released annually to air, water, and land. Searches by facility, substance, industry/other sources, geographic location. Includes aggregated data for sources other than large industrial ones. Can search for data by airshed and water catchments.	2.1	PRTR database website
3.3.6	Canada's National Pollutant Release Inventory (NPRI)	http://www.ec.gc.ca/pdb/npri/	Data on total amount of pollutants released annually to air, water, land and amounts transferred off-site from major industrial sites in Canada. Searches by facility, substance, postal code, name of community, industry sector code. Provides data on criteria air contaminants from diverse sources for geographic searches. Also includes criteria air contaminants (1995 data) summarized by source category by substance for geographic area.	2.1	PRTR database website
3.3.6	European Pollutant Emission Register (EPER): Central Data Repository	http://cdr.eionet.eu.int/	Member countries of the European Commission are required to report emissions (air and water) information from industries on a list of 50 pollutants every 3 years (2001 as reported in 2003 was first year). EPER and other reports by country.	2.1	PRTR database

Use Category	Organization	Web Source	Description	Tool	Tool Used
3.3.6	Ireland Pollutant Emissions Register (PER)	http://www.epa.ie/licences/ipc.htm	Annual Environmental Report required for permitted facilities includes mass balance for substances. Available to public, but not available on Internet. Air and water emissions have been submitted to EPER.	2.1	PRTR database
3.3.6	Japan PRTR	MOE: http://www.env.go.jp/chemi/prtr/risk0. html and http://www.prtr-info.jp/ METI: http://www.meti.go.jp/policy/chemical_management/law/prtr/index.html NITE: http://www.prtr.nite.go.jp/index-e.html	Ministry of the Environment (MOE), Ministry of Economy, Trade and Industry (METI) and National Institute of Technology and Evaluation (NITE) websites. Summarize PRTR data and information on the reporting system.	2.1	PRTR database
3.3.6	Netherlands Emission Inventory System	http://www.mep.tno.nl/	Data on air, water, and waste from large industrial facilities. Collective Emissions Inventory includes general survey of emissions from smaller companies and diffuse sources. Database maintained by TNO-MEP (independent research institution).	2.1	PRTR database
3.3.6	Norwegian Pollutant Release and Transfer Register (INKOSYS)	In English: http://www.sft.no/bmi/Main/english.asp In Norwegian: http://www.sft.no/bmi/	Annual emissions to air and water of regulated substances by facilities with discharge permits. Used by government for compliance assurance and in State of the Environment reports. PRTR data and permits, permissible pollutant production volumes, types of waste generated, energy consumption are on Internet and can be retrieved by company name or map search.	2.1	PRTR database website
3.3.6	Sweden's Pollutant Release and Transfer Register (PRTR)	http://www.naturvardsverket.se/prtr	Data on air, water, waste, and product from large industrial facilities for 70 substances or groups of substances. First reporting year 2001. Can search by facility, substance, county/city, industry sector.	2.1	PRTR database website
3.3.6	U.S. Toxics Release Inventory: TRI Explorer	http://www.epa.gov/triexplorer/	Data on total amount of substances released annually to air, water, land and amounts transferred off-site from major industrial sites in U.S. Searches by substance, geographic division, industry sector code. Includes 1988-2001 data.	2.1	PRTR database website
3.3.6	U.S. Toxics Release Inventory: Window to My Environment	http://www.epa.gov/enviro/wme/	Searches by postal code or city produce a map with TRI facilities and other regulated sites (hazardous waste, water dischargers). Can obtain reported amounts of substances. Includes 1987-2001 data.	2.1	PRTR database website

Use Category	Organization	Web Source	Description	Tool	Tool Used
3.3.6	United Kingdom's Pollution Inventory (PI)	http://www.environment-agency.gov.uk/pi	Data on total amount of pollutants released annually to air, water, and sewers from major industrial sites in England and Wales. Environmental improvements made to industrial sites. Does not include amount of substance in transfers. Maps location of facility and shows other sites (landfills, river quality monitoring sites, groundwater source protection zones, flood plains).	2.1, 2.2, 2.3	PRTR database website
3.3.7	European Pollutant Emission Register (EPER)	http://europa.eu.int/comm/environment/ ippc/eper/	Member countries of the European Commission are required to report emissions (air and water) information from industries on a list of 50 pollutants every 3 years (2001 as reported in 2003 was first year).	2.1	PRTR database
3.3.7	International Programme on Chemical Safety: Concise International Chemical Assessment Documents (CICADs)	http://www.who.int/pcs/ra_site/cicads.htm	Concise International Chemical Assessment Documents (CICADs) are risk assessment documents for individual chemicals produced by a cooperative program of the World Health Organization (WHO), the International Labour Organization (ILO), and the United Nations Environmental Programme (UNEP). The documents provide summaries of potential human health and environmental effects of the chemicals. PRTR data (from countries with PRTR data) are included in the section on anthropogenic sources of human and environmental exposure.	2.1	PRTR data
3.3.7	United Kingdom Environment Agency	E-mail communication from Pollution Inventory Team, Environment Agency, United Kingdom: http://www.environment-agency.gov.uk/	PRTR data were used to provide an assessment of the relative importance of industrial sectors regulated by the Environment Agency as contributors to emissions of the European Union's Water Framework Directive substances to water and air. The major/minor/negligible source distinction will be a main criterion to be taken into account when deciding whether sources/substances control measures should be developed and proposed at European Union level or national level.	2.1	PRTR data
3.4.1	FTSE4Good Index	http://www.ftse.com/ftse4good/ criteria_methodology.jsp	Fund classifies company's environmental impact (low, medium, high) based on industry sector and sector's PRTR data, among other environmental data. Covers U.S., Global, UK, and Europe markets. PRTR data for a company is one screening criterion.	2..1	PRTR data
3.4.2	Commission for Environmental Cooperation of North America	http://www.cec.org/pubs_docs/documents/ index.cfm?varlan=english&ID=1170	Meeting on Finance and the Environment: Transparency, Disclosure, and Environmental Reporting. Discusses use of PRTR data in investment community.	2.1	PRTR data
3.4.2	Groupe Investissement Responsable	http://www.investissementresponsable. com/	Provides investors with industry analyses that offer a detailed look at the opportunities in relation to environmental performance. Will use NPRI data in report on the Canadian Oil and Gas and Forest products sectors.	2.1	PRTR data

Use Category	Organization	Web Source	Description	Tool	Tool Used
3.4.1, 3.4.2	EIRIS (Ethical Investment Research Service)	http://www.eiris.org/	Provides investors, institutions, and fund indexes with company ratings based on environmental data, including PRTR data.	2.1	PRTR data
3.5.1	Australian Journal of Political Science	http://www.ingenta.com/isis/searching/ExpandSearch/ingenta;jsessionid=16ccgmd3obrn9?title=%22australian+National+Pollutant+Inventory%22&title_type=tka&date_type=range&year_from=1997&year_to=2003&database=1&pageStart=1&index=2	The Australian National Pollutant Inventory (NPI) is designed to generate political and economic incentives for industry to move toward cleaner production. It enables community groups to put pressure on polluters and provides an opportunity for firms to identify inefficiencies. The inventory is built upon several liberal-democratic premises regarding the power of knowledge, the right to know, the effectiveness of pressure groups, and the ability of government to correct market failures. This paper analyzes the NPI using the U.S. TRI as a benchmark for comparison. Journal Article: M. Howes. 2001. What's your poison? The Australian National Pollutant Inventory versus the U.S. Toxics Release Inventory. Australian Journal of Political Science. 36(3):529-552.	2.1	PRTR data
3.5.1	Commission for Environmental Cooperation of North America	http://www.cec.org/pubs_docs/documents/index.cfm?varlan=english&ID=940	Workshop on Exploring Pollutant Release and Transfer Data in North America: Experience and Future Opportunities in the Academic Community. Summarizes academic research in Canada, Mexico, and U.S. using PRTR data.	2.1	PRTR data
3.5.1	The Rose Foundation	http://www.rosefdn.org/efp.html	Environmental Fiduciary Project. Describes studies indicating that companies that perform better environmentally also tend to produce better financial results.	2.1	PRTR Data
3.5.1	Water Quality Research Journal of Canada	http://www4.infotrieve.com/search/databases/detailsNew.asp?artID=10311882	A large-scale study on bisphenol A (BPA) contamination in Canadian municipal and industrial wastewater and sludge has been completed. Based on these data, on-site releases of BPA by industrial facilities seem to be much more widespread than the National Pollutant Release Inventory (NPRI) database has suggested. Journal Article: HB. Lee and T.E. Peart. 2000. Bisphenol A contamination in Canadian municipal and industrial wastewater and sludge samples. Water Quality Research Journal of Canada 35(2):283-298.	2.1	PRTR Data
3.5.2	Canadian Institute for Environmental Law and Policy	http://www.cielap.org/npri.html	Maps and Teaching Guide (for elementary and high schools) to using NPRI data.	2.1	PRTR Data

Use Category	Organization	Web Source	Description	Tool	Tool Used
3.5.2	Pembina Institute for Appropriate Development, Ottawa, Canada	http://www.pembina.org	Classroom demonstrations of websites with PRTR data. Limitation is that databases do not cover education and research institutions.	2.1	PRTR Data
3.5.2	Toxics Use Reduction Institute	http://www.turi.org/education/index.htm#TURPlan	Course offered to business on toxics use reduction planning. Toxics use reduction plans are required under the Massachusetts PRTR system.	2.1	PRTR Data
3.5.3	TNO-MEP (TNO Environment, Energy and Process Innovation), Department Emission Assessment	http://www.mep.tno.nl/	This organization maintains Netherlands PRTR database. Reports are done for national, regional, and municipal governments; industry; and trade associations using PRTR data. Data are used to assess the effects of environmental policy, to ascertain trends, and to supply data for modeling studies.	2.1	PRTR Data
3.5.3	Toxics Use Reduction Institute: Toxics Use Reduction Networking (TURN) Grant Program	http://www.turi.org/HTMLSrc/Communities.html	The Toxics Use Reduction Institute awards grants to community and environmental organizations and local governments to raise awareness and work on reducing toxic chemical use. One example was a regional workshop on toxics use reduction based on data submitted by local businesses on toxics usage. The workshop provides an overview of the PRTR data, alternatives to toxics use, pollution prevention opportunities, and resources available from state agencies. Institute works with the Massachusetts Office of Technical Assistance. Massachusetts PRTR database includes data on toxics use.	2.1	PRTR Data
TOOL: RANKING					
3.1.1	Citizens' Environmental Alliance of Southwestern Ontario	http://www.mnsi.net/~cea/	Annual reports summarizing Canadian PRTR data for local community. With 1999 data added U.S. PRTR data for community directly across the border.	2.1, 2.2	PRTR Data, Ranking
3.1.1	National Environmental Trust	http://environet.policy.net/relatives/4280.pdf	Report examining PRTR releases of chemicals that are of specific concern for child development, learning, and behavior. Examines selected substances that are classified as developmental and neurological toxins.	2.2	Ranking
3.1.2	Ontario Clean Air Alliance	http://www.cleanair.web.net/resource/index.html	Studies using NPRI data to assess actions by industry (e.g., Fact Sheets on individual facilities). Includes recommendations for changes in industry programs.	2.2	Ranking

Use Category	Organization	Web Source	Description	Tool	Tool Used
3.1.2	PollutionWatch	http://www.pollutionwatch.org/	Website that provides Canadian PRTR data plus health effects matrix. Ranks companies/facilities/municipalities by PRTR data categories. Retrieves data by postal code.	2.1, 2.2, 2.3, 2.5	PRTR Data, Ranking and GIS Mapping, Risk Screening
3.1.3	Ontario Clean Air Alliance	http://www.cleanair.web.net/resource/index.html - reports	Studies using NPRI data to assess actions by government (e.g., "Up the Stack: Coal-fired Electricity's Toxic Impact"). Includes recommendations for changes in government programs.	2.2	Ranking
3.1.3	U.S. PIRG (Public Interest Research Group)	http://pirg.org/reports/enviro/poison/	Report examining PRTR and municipal sewage treatment plant discharges to surface waters in the U.S. Maps by county; ranks by river, state, substance; includes compliance data.	2.2, 2.3	Ranking and GIS Mapping
3.1.6	Environmental Defense: Scorecard	http://www.scorecard.org/	Website presents TRI data by ethnicity, income, age, education level by state and county and compares to other jurisdictions.	2.1, 2.2	PRTR Data, Ranking
3.1.6	Friends of the Earth, United Kingdom	http://www.foe.co.uk/campaigns/sustainable_development/pollution_and_poverty/	Two studies showing facilities more likely to be found in poorer communities. 1999 study related facilities in PRTR database to average household income of location. Only location and income. No statistical analysis or other factors (type and scale of industry, emissions, exposure, age, gender, ethnicity) were included. Acknowledges need for larger research effort. 2000 study focused on air emissions of carcinogens and made recommendations for changes in government activities.	2.2	Ranking
3.3.1	United Kingdom's Spotlight on Business Performance	http://www.environment-agency.gov.uk/commondata/105385/spt_2002full_523404.pdf	Annual assessment of good and poor environmental performance by businesses in England and Wales. The report covers nine business sectors (chemicals, construction, farming, fuel and power, metals, minerals, waste, water, and other businesses including retailers and general manufacturing) and their emissions, operator performance, waste production, pollution incidents, and prosecutions and fines over the previous year. The Pollution Inventory emissions data reported by each sector are compared with previous years of data to illustrate significant changes in emissions across the sector, and by individual sites to characterize "good and bad performers." Some of the sites demonstrating significant changes are used as case studies to illustrate good and bad practice. Uses PRTR data to identify good performers.	2.2	Ranking
3.3.1, 3.3.2	Indonesia's Program for Pollution Control Evaluation and Rating (PROPER)	http://www.worldbank.org/nipr/work_paper/PROPER2.pdf	Performance rating of water polluters, with six months' notice before making rating public. Half those notified improved rating before public disclosure. Does not disclose raw data to public for first six months, but facilities use data to cut pollution. Last ratings were 1998 due to financial crisis; new ratings slated for 2003. This system being considered in other Asian countries.	2.2	Ranking

Use Category	Organization	Web Source	Description	Tool	Tool Used
3.3.5	Japan Eco-Chemi	http://env.safetyeng.bsk.ynu.ac.jp/ecochemi/	Mapping tool that includes PRTR data by location, monitoring data for air and water quality, and demographic data. Searches by prefecture, substance, industry sector, and type of release. Model to simulate impact of a new source. Will rank on facilities, releases, air/water quality.	2.2	Ranking
3.3.6	United Kingdom's Pollution Inventory (PI)	http://www.environment-agency.gov.uk/pi	Data on total amount of pollutants released annually to air, water, and sewers from major industrial sites in England and Wales. Environmental improvements made to industrial sites. Does not include amount of substance in transfers. Maps location of facility and shows other sites (landfills, river quality monitoring sites, groundwater source protection zones, flood plains).	2.1, 2.2, 2.3	PRTR database website
3.4.2	Dow Jones Sustainability Indexes	http://www.sustainability-index.com	Companies are ranked within their industry based on a standard questionnaire. Questionnaire includes environmental performance—trend in total waste generation, % waste disposed in landfill, how frequently are data collected, does company maintain centralized database. Both worldwide and European Indexes. Minimal PRTR data.	2.2	Ranking
TOOL: GEOGRAPHIC INFORMATION SYSTEM					
3.1.2	Environmental Defense: Scorecard	http://www.scorecard.org	Website with TRI and other data. Ranks by facility, state, county, postal code, health effects. Links to health effects information. Maps can locate a facility. Limitation: Multi-year data do not account for reporting changes, so trends are misleading.	2.3, 2.4	GIS Mapping, Toxicity Weighting, Ranking
3.1.2	PollutionWatch	http://www.pollutionwatch.org/	Website that provides Canadian PRTR data plus health effects matrix. Ranks companies/facilities/municipalities by PRTR data categories. Retrieves data by postal code.	2.1, 2.2, 2.3, 2.5	PRTR Data, Ranking and GIS Mapping, Risk Screening
3.1.3	U.S. PIRG (Public Interest Research Group)	http://pirg.org/reports/enviro/poison/	Report examining PRTR and municipal sewage treatment plant discharges to surface waters in the U.S. Maps by county; ranks by river, state, substance; includes compliance data.	2.2, 2.3	Ranking and GIS Mapping
3.1.6, 3.5.1	British Columbia Institute of Technology	http://giswww1.bcit.ca/giscentre/projects2002.htm and http://giswww1.bcit.ca/projects2002/ project7/index.htm	Student project (2002) to correlate location of facilities and minority residence (low income groups, ethnic minorities) in Vancouver, Calgary, and Edmonton. GIS model was developed as a student project.	2.3	GIS Mapping

Use Category	Organization	Web Source	Description	Tool	Tool Used
3.3.2	U.S. Environmental Protection Agency, Brownfields Project	http://www.epa.gov/brownfields/html-doc/lv3.htm	This project describes the possible uses for LandView in assessing a site for redevelopment. The LandView mapping tool can assist in developing an inventory of potentially contaminated properties as well as existing facilities that may impact the environmental and economic feasibility of beneficial reuse options for a site. The census data provide demographic data such as population, household income, labor force participation, and educational attainment for the area.	2.3	GIS Mapping
3.3.5	New York State Department of Health: Cancer Surveillance Improvement Initiative	http://www.health.state.ny.us/nysdoh/ cancer/sublevel/infobull.htm	An interdisciplinary team is investigating unusual disease patterns in the state. The unusual disease pattern protocol includes identification of postal codes where unusually high rates of cancer have been identified and compilation of existing environmental data (including TRI data) for the postal codes. A GIS will aid in conducting an exposure evaluation of the areas. The study aims to increase understanding of factors that cause cancer in New York State and of opportunities to reduce or eliminate the exposures.	2.3, 2.5	GIS Mapping, Risk Screening
3.3.6	United Kingdom's Pollution Inventory (PI)	http://www.environment-agency.gov.uk/pi	Data on total amount of pollutants released annually to air, water, and sewers from major industrial sites in England and Wales. Environmental improvements made to industrial sites. Does not include amount of substance in transfers. Maps location of facility and shows other sites (landfills, river quality monitoring sites, groundwater source protection zones, flood plains).	2.1, 2.2, 2.3	PRTR database website
3.5.1	University of Trent, Peterborough, Ontario, Canada	mmacleod@tremtu.ca	Applications of contaminant fate model (BETR North America) that calculates air concentrations of a substance in ecological regions of North America that result from emissions from PRTR identified sources and population-based diffuse sources.	2.3	GIS Mapping
3.5.2	PollutionWatch	http://www.pollutionwatch.org/tools/ teachModule.jsp	Classroom guide to maps showing NPRI data. Not specific enough for teachers; needs to reference particular lessons, but this is difficult since lessons differ from school to school.	2.3	GIS Mapping
TOOL: TOXICITY WEIGHTING					
3.1.2	Environmental Defense: Scorecard	http://www.scorecard.org	Website with TRI and other data. Ranks by facility, state, county, postal code, health effects. Links to health effects information. Maps can locate a facility. Limitation: Multi-year data do not account for reporting changes, so trends are misleading.	2.3, 2.4	GIS Mapping, Toxicity Weighting, Ranking

Use Category	Organization	Web Source	Description	Tool	Tool Used
3.1.5	Canadian Institute for Environmental Law and Policy	http://www.cielap.org/npri.html	The NPRI Guide describes one example of the use of a toxicity weighting scheme. This weighted analysis showed that the Montreal Urban Community's new sewage treatment plant was one of the worst polluters along this part of the St. Lawrence River. The finding was used as a basis for a report that urged action to improve Montreal's sewage treatment system by requiring industries that discharge into Montreal's sewers to pre-treat or eliminate their toxic discharges.	2.4	Toxicity Weighting
3.2.1	ICI Environmental Burden Approach	http://www.ici.com/icishe/2000/pages/past11.htm	PRTR data used as input to its weighting scheme (called Environmental Burden) for environmental management decision-making. Other data used include potency factors and emissions of other substances.	2.4	Toxicity Weighting
3.2.2	Environmental Management System at Acushnet Rubber Company	http://www.epa.gov/dfe/pubs/iems/bulletins/bullet01/index.html	Acushnet Rubber Company used PRTR data to develop and meet a specific goal of its Environmental Management System. Among the PRTR chemicals, Acushnet set a target for complete elimination of TCE for several reasons, including its hazardous waste disposal costs and TCE's toxicity rating (listed as potential carcinogen on IARC). Cost savings from elimination are estimated at USD100,000 annually.	2.4	Toxicity Weighting
3.3.5	U.S. Environmental Protection Agency, Risk-Screening Environmental Indicators Model	http://www.epa.gov/opptintr/rsei/index.html	Computer-based model that permits screening-level analyses. Users can relate amounts of chemical releases and transfers to estimate the hazard and risk-related impacts (toxicity, exposure level, exposed population) associated with each reporting facility, relative to one another.	2.4, 2.5, 2.7	Toxicity Weighting, Risk Screening, Environmental Indicators
3.5.1	University of British Columbia	http://www.ingenta.com/isis/searching/ExpandSearch/ingenta;jsessionid=1eb8vfj3l8hr2?author=antweiler&journal=canadian+journal+of+economics&journal_type=words&date_type=range&year_from=1997&year_to=2003&database=1&pageStart=1&index=1	Tests the prediction that "environmentally-leveraged" firms with consumer market exposure experience larger emission reductions. Uses 1993–99 panel data from Canada's National Pollutant Release Inventory (NPRI), with pollutants adjusted for toxicity. Journal Article: W. Antweiler and K. Harrison. 2003. Toxic release inventories and green consumerism: empirical evidence from Canada. Canadian Journal of Economics. 36(2):495-520(26).	2.4	Toxicity Weighting

Use Category	Organization	Web Source	Description	Tool	Tool Used
TOOL: RISK SCREENING					
3.3.1	Environment Canada - Atlantic Region	http://www.ns.ec.gc.ca/epb/air_toxics/	For a program to measure the environmental risks associated with priority toxic substances in the region as well as selected substances of national concern, a version of the Chemical Hazard Evaluation for Management Strategies (CHEMS) ranking model was used to evaluate the risk to human health and the environment of NPRI pollutants released and transferred for disposal in the Atlantic Provinces. The CHEMS model is a first step in prioritizing substances for further evaluation. A higher level of quantitative analysis and expert investigation is required before final conclusions can be reached about the relative toxicity, risk, and impact of NPRI pollutants and control strategies developed for the highest risk substances.	2.5	Risk Screening
3.1.2	PollutionWatch	http://www.pollutionwatch.org/	Website that provides Canadian PRTR data plus health effects matrix. Ranks companies/facilities/municipalities by PRTR data categories. Retrieves data by postal code.	2.1, 2.2, 2.3, 2.5	PRTR Data, Ranking and GIS Mapping, Risk Screening
3.3.1	Public Environmental Reporting (PER) (Australia)	http://www.ea.gov.au/industry/finance/publications/framework/index.html	Australian government report on benefits and framework for voluntary public presentation of information by corporations. Actual reports are published by companies.	2.5	Environmental Indicators
3.2	Massachusetts Office of Technical Assistance for Toxics Use Reduction	http://www.state.ma.us/ota	Office of state government that assists industrial facilities, municipalities, schools, hospitals, and households to reduce or eliminate their use of toxics and generation of hazardous waste. Case studies show use of Massachusetts TURA data to identify pollution prevention projects. TURA data include releases, transfers and use and system requires a pollution prevention plan.	2.1, 2.5	PRTR Data, Risk screening
3.3.5	New York State Department of Health: Cancer Surveillance Improvement Initiative	http://www.health.state.ny.us/nysdoh/ cancer/sublevel/infobull.htm	An interdisciplinary team is investigating unusual disease patterns in the state. The unusual disease pattern protocol includes identification of postal codes where unusually high rates of cancer have been identified and compilation of existing environmental data (including TRI data) for the postal codes. A GIS will aid in conducting an exposure evaluation of the areas. The study aims to increase understanding of factors that cause cancer in New York State and of opportunities to reduce or eliminate the exposures.	2.3, 2.5	GIS Mapping, Risk Screening
3.3.5	U.S. Environmental Protection Agency, Risk-Screening Environmental Indicators Model	http://www.epa.gov/opptintr/rsei/index.html	Computer-based model that permits screening-level analyses. Users can relate amounts of chemical releases and transfers to estimate the hazard and risk-related impacts (toxicity, exposure level, exposed population) associated with each reporting facility, relative to one another.	2.4, 2.5, 2.7	Toxicity Weighting, Risk Screening, Environmental Indicators

Use Category	Organization	Web Source	Description	Tool	Tool Used
3.5.1	Kanto Gakuin University, Japan and Trent University, Canada	http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B6V74-43C5C63-C&_user=10&_handle=W-WA-A-A-VD-MsSAYZA-UUW-AUZVCYABCY-CYVEBVV-VD-U&_fmt=summary&_coverDate=08%2F31%2F2001&_rdoc=11&_orig=browse&_srch=%23toc%235832%232001%23999559995%2325410 1!	The European Union System for Evaluation of Substances (EUSES) and the ChemCAN chemical fate model are applied to describe the fate of 68 chemicals on two spatial scales in Japan. Emission information on the chemicals has been obtained from Japan's Pollutant Release and Transfer Registry and available monitoring data gathered from government reports. Journal Article: K. Kawamoto, M. MacLeod, D. MacKay. 2001. Evaluation and comparison of multimedia mass balance models of chemical fate: application of EUSES and ChemCAN to 68 chemicals in Japan. Chemosphere. 44(4):599-612. Journal article authors: kawamoto@kanto-gakuin.ac.jp, mmacleod@trentu.ca.	2.5	Risk Screening
TOOL: NORMALIZATION					
3.1.6	Environmental Justice Resource Center	http://www.ejrc.cau.edu/convent_report.html	Report examines "toxic burden" in St. James Parish, Louisiana, using PRTR per square mile, per person, and per job in relation to nation as a whole and state as a whole.	2.6	Normalization
3.2.1, 3.2.2	3M Company	http://www.3m.com/about3m/sustainability/?	Annual environmental progress report. Trends 1990-2001. Tallies amount of pollution prevented. Eco-efficiency matrix gives TRI releases/USD million sales for U.S. facilities.	2.1, 2.6	PRTR Data, Normalization
3.2.3	General Motors Corporation	http://www.gm.com/company/gmability/environment/annual_reports/index.html	Corporate Responsibility and Sustainability Report includes summary of NPRI and TRI data; data per vehicle produced; and, for each U.S. facility, number of employees, vehicles produced, description of operations, and TRI data for three years by type of release and pounds per vehicle produced and by substance. Can search for a facility by state on map of U.S.	2.1, 2.6	PRTR Data, Normalization
3.2.3	PG&E Corporation	http://www.pgecorp.com/news/environment/	2001 Environmental Report by this electric utility company presents TRI releases as pounds per megawatt-hour.	2.6	Normalization
3.3.2	U.S. Environmental Protection Agency, Sector Facility Indexing Project	http://www.epa.gov/sfipmtn1/	Profiles of facilities within five industry sectors. Data include PRTR data, regulatory compliance data, demographic and production data. Rankings based on ratio of releases/production. PRTR data for all chemicals and for carcinogens/metals only. PRTR data not current. Compliance data more current and available elsewhere. Had intended to have toxicity weighting, but never implemented.	2.6	Normalization

Use Category	Organization	Web Source	Description	Tool	Tool Used
3.3.4	Oregon Toxic Use and Hazardous Waste Reduction Law: 2002 Status Report	http://www.deq.state.or.us/wmc/tuwrap/documents/TUR2002StatusRpt.pdf	The 1989 Act promotes pollution prevention planning for the reduction of both the use of toxic chemicals and the generation of hazardous waste. TRI facilities are subject to the planning requirements. One measure of "use reduction" is the change in the number of facilities reporting to TRI since reporting is based on "use" of the toxic chemical. TRI releases are also normalized by Gross State Product when assessing trends.	2.1, 2.6	PRTR Data, Normalization
3.4.1, 3.4.2	Investor Responsibility Research Center	http://www.irrc.org/prod_serv/products_environmental.htm	Maintains a "Corporate Environmental Profiles Database" for portfolio screening. Uses TRI data among other USEPA databases. Creates indices for companies and industry sectors.	2.6	Normalization
3.5.1	Political Economy Research Institute (PERI)	http://www.umass.edu/peri/pdfs/WP12.pdf	"Defending the Public Domain: Pollution, Subsidies, and Poverty" report calculates a "pollution subsidy" as the costs that manufacturers avoid by spending less than the national average per pound of toxic pollution times the total pounds released in a state.	2.6	Normalization
3.5.1	University of California Riverside, Department of Economics, Riverside California, USA	http://www.economics.ucr.edu/seminars/1_8_03.pdf	Study of causes of relocation of firms from the U.S. to Mexico using PRTR data to identify companies and measure their change in waste generation before and after NAFTA.	2.6	Normalization
TOOL: ENVIRONMENTAL INDICATORS					
3.1.3	Silicon Valley Environmental Partnership	http://www.svep.org/	Toxic releases are one of about 20 indicators used to assess environmental trends. Trends are used to assess progress, identify priorities, and design actions for environmental improvement.	2.7	Environmental Indicators
3.1.7, 3.1.5	The Access Initiative	http://www.accessinitiative.org/	CD-ROM Assessment Tool to help NGOs assess their government's commitment to public access to information and participation. Developed by global coalition of public interest groups collaborating to promote national-level implementation of commitments to access to information, participation, and justice in environmental decision-making. PRTR is one of key elements of public participation system in reporting and public disclosure of information about environmental performance and compliance by industrial facilities.	2.7	Environmental Indicators
3.3.1	State of Environment Report, British Columbia, Canada	http://wlapwww.gov.bc.ca/soerpt/soereporting.html	State of Environment Report (Environmental Trends in British Columbia 2002) includes variety of environmental indicators, including NPRI data on on-site releases 1993-2000. Discusses trends and reasons for change.	2.7	Environmental Indicators

Use Category	Organization	Web Source	Description	Tool	Tool Used
3.3.5	U.S. Environmental Protection Agency, Risk-Screening Environmental Indicators Model	http://www.epa.gov/opptintr/rsei/index.html	Computer-based model that permits screening-level analyses. Users can relate amounts of chemical releases and transfers to estimate the hazard and risk-related impacts (toxicity, exposure level, exposed population) associated with each reporting facility, relative to one another.	2.4, 2.5, 2.7	Toxicity Weighting, Risk Screening, Environmental Indicators
3.5.1	Political Economy Research Institute (PERI), University of Massachusetts, USA	http://www.umass.edu/peri/pdfs/WP18.pdf and http://www.umass.edu/peri/pdfs/WP50.pdf	Application of EPA RSEI tool: studies of whether risk from airborne chemical emissions is associated with race, ethnicity, and socioeconomic class.	2.7	Environmental Indicators
3.5.3	Ireland EPA and Clean Technology Centre	http://www.epa.ie/r_d/downloads/publications/phase 1/mediumscale/MS-10-M1_for_web.pdf	Report on Environmental Benchmarking for IPC Industries surveyed use of PRTR data (includes releases, amounts in waste and in product) as indicator of performance and to improve business performance. Study found that international companies more likely to use than Irish companies.	2.7	Environmental Indicators

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