

**Joint Public Meeting of the Sound Management of Chemicals (SMOC)  
Program and the Consultative Group for the North American Pollutant  
Release and Transfer Register (PRTR) Project**

**17 October 2002**

**Hotel Villa Bejar, Av. Domingo Diez No. 2350  
Cuernavaca, Morelos, Mexico**

**Opportunities for SMOC-PRTR Linkages**



**Discussion Paper**



This discussion paper has been prepared for the first joint meeting of two initiatives of the Commission for Environmental Cooperation (CEC), the Sound Management of Chemicals (SMOC) and the Pollutant Release and Transfer Register (PRTR) project. The purpose of the joint meeting is to focus on opportunities for strengthening PRTR-SMOC linkages, with a focus on chemicals of common concern including mercury, dioxins and furans and hexachlorobenzene. The meeting will be held in Cuernavaca on 17 October 2002. For more information about the CEC or background on these initiatives, please see the CEC web site at <http://www.cec.org>.

There are many similarities between the SMOC and PRTR initiatives. Both cover chemicals of concern to human health and the environment; involve governments, academic, aboriginal, industry and non-governmental groups in the three countries, and seek to improve our knowledge and understanding of chemicals in North America. The challenge before us is to increase the linkages between the two programs, and so contribute to reducing the risks of toxic chemicals to human health and the environment.

## **1. What is the Sound Management of Chemicals (SMOC) Initiative**

The CEC Council (of environmental ministers) adopted Resolution 95-05 on the Sound Management of Chemicals (SMOC) on 13 October 1995. The SMOC project is an ongoing intergovernmental initiative to reduce the risks of toxic substances to human health and the environment. The Resolution adopted as a priority the development of North American Regional Action Plans (NARAPs) for certain persistent and bioaccumulative toxic substances. The SMOC project provides a forum for:

- identifying priority chemical pollution issues of regional concern,
- developing NARAPs to address these priority issues,
- overseeing the implementation of approved NARAPs, and
- facilitating and encouraging capacity building in support of the overall goals of SMOC.

Four NARAPs (for DDT, chlordane, PCBs, and mercury) have been developed and are now at various stages of implementation. A NARAP for dioxins/furans and hexachlorobenzene is being developed, and lead is being considered for potential action under SMOC. These substance-specific NARAPs outline:

- specific objectives for reducing exposure to the substances of North American ecosystems, fish and wildlife, and especially humans, and preventing and promoting continuing reductions in anthropogenic releases to the environment of the substances,
- current conditions with respect to the use of the chemical in each country, and
- joint and individual actions the three governments can take to improve the capacity in the region to reduce use and release of, and exposures to, the chemical.

In addition, a NARAP on environment monitoring and assessment has been developed. The broad objective of this NARAP is to adapt and build on existing infrastructure and institutional arrangements and promote collaboration with regard to acquisition of environmental data and information for purposes of assessing the exposure and risks to human health and the environment. Information on the presence, levels, trends, and effects of substances are

important for identifying emerging SMOC issues and for assessing the environmental results of regional and international efforts to reduce the risks associated with substances being addressed under the substance-specific NARAPs.

Resolution 95-05 also established a working group to:

- incorporate, as appropriate, pollution prevention principles and precautionary approaches in NARAP,
- recommend concerted activities to reduce risks presented by toxic chemicals, taking into account the entire life cycle of the chemicals, and
- recommend policies, regulatory and non-regulatory measures to identify and minimize exposure to toxic chemicals by replacing them with less toxic substitutes and ultimately phasing out the chemicals that pose unreasonable and otherwise unmanageable risks to human health and the environment and those that are toxic, persistent and bioaccumulative and whose use cannot be adequately controlled.

## **2. What is a PRTR?**

One source of information about the amount of toxic chemicals being released into the environment is a type of reporting system known internationally as “Pollutant Release and Transfer Registers (PRTRs)”. Every year across North America, industrial facilities report on the amount of chemicals they released into the air, land, water and injected underground. The amount of chemicals transferred off-site for disposal, treatment and recycling is also reported. This information, the PRTR data, is collected by national governments each year and compiled into annual reports and electronic databases made available to the public. PRTRs generally provide detailed data on types, locations, and amounts of chemicals released on-site and transferred off-site by industrial and other facilities.

PRTRs are an innovative tool that can be used for a variety of purposes. They track certain chemicals and thereby can help industry, government and citizens identify ways to prevent pollution, reduce waste generation, decrease releases and transfers and increase responsibility for chemical use. Many corporations use the data to report on their environmental performance and identify opportunities for reducing and preventing pollution. Governments can use PRTR data to shift program priorities, or track progress in reducing certain chemicals or in certain regions. Communities and citizens can use PRTR data to gain an understanding of the sources and management of pollutants and as a basis for dialogue with facilities and governments.

The basic elements of a PRTR system, as identified in the CEC Council Resolution 00-07, are:

- reporting on individual substances,
- reporting by individual facilities,
- covering all environmental media (i.e. releases to air, water, land and underground injections, and transfers off-site for further management),
- mandatory, periodic reporting (i.e. annually),
- public disclosure of reported data on a facility- and chemical-specific basis,
- standardized reporting using computerized data management,
- limited data confidentiality and indicating what is being held confidential,
- comprehensive scope, and
- mechanism for public feedback for improvement of the system.

PRTRs collect data on **individual chemicals**, rather than on the volume of wastestreams containing mixtures of substances, because this allows the compilation and tracking of data on releases and transfers of individual chemicals. **Reporting by facility** is key to locating where releases occur and who or what generated them.

PRTR data are just one source of information on toxic chemicals in the environment. Other sources of information include measurements of concentrations of chemicals in the air, land and water in our communities, inventories of chemicals such as specialized chemical inventories, hazardous waste databases and air pollutant inventories, modeling estimates, and industrial emission rates of chemicals.

An important consideration in making good use of PRTR data is to know its limitations. PRTR data is one part of the pollution picture. PRTR data does not include:

- all potentially harmful chemicals, just those on the chemical lists
- chemicals released from mobile sources such as cars and trucks
- chemicals released from natural sources such as forest fires and erosion
- chemicals released from small sources such as dry cleaners and gas stations
- chemicals released from small manufacturing facilities with less than 10 employees, or
- information on the exposure, risks, toxicity or potential health effects of chemicals.

Each country in North America collects information on chemical releases and transfers. In Canada, the **National Pollutant Release Inventory (NPRI)** collected its first information on chemical releases and transfers in 1993. Since then it has expanded to 265 chemicals reported by over 2,000 facilities for the 2001 reporting year. Fifty-five of these chemicals have been declared toxic under the Canadian Environmental Protection Act, 1999. More information on the NPRI can be viewed at Environment Canada's web site at <<http://www.ec.gc.ca/pdb>>.

With the passage of enabling legislation in 2001, Mexico has made great strides towards making reporting to its **Registro de Emisiones y Transferencia de Contaminantes (RETC)** mandatory and publicly accessible. For 1999, approximately 120 industrial facilities under federal jurisdiction voluntarily reported their annual releases and transfers of 104 chemicals. Information has been available by sector and by region only. For more information Mexico's RETC program see <<http://www.semarnat.gob.mx>>.

Now coming up to its fifteenth year in operation, the **Toxic Release Inventory (TRI)** in the United States currently collects information on the releases and transfers of over 650 chemicals from over 22,000 facilities. For more information the TRI program see <<http://www.epa.gov/tri>>.

Each country has set up its PRTR to reflect local conditions, laws and objectives. Fortunately, a common basic set of elements allows much of the information collected in the Canadian NPRI and the US TRI to be matched. The currently voluntary nature of RETC reporting makes those data difficult to match.

The CEC, through its annual report, *Taking Stock*, provides a North American perspective on the amounts of chemicals released to the air, land, water and transferred offsite. The CEC takes the common chemicals and elements of the NPRI and TRI data and produces a matched North American data set. The *Taking Stock* report and queries to the matched data set can be viewed at <<http://www.cec.org/takingstock>>.

### **3. What is reported to the North American PRTRs?**

North American PRTR data provide estimates of the amount of substance in:

- On-site air emissions
- On-site discharges to surface waters
- On-site land disposal
- On-site underground injection of wastes
- Transfers off-site for disposal
- Transfers off-site for treatment
- Transfers off-site for recycling
- Transfers off-site for energy recovery
- Types of pollution prevention activities performed

The US TRI has additional reporting covering on-site waste management (on-site treatment, recycling and energy recovery) while the Canadian NPRI facilities report the number of employees and supplies comments on reasons for changes in their data from year to year.

Analyses are possible for individual facilities, industrial sectors, geographic areas, and specific chemicals or categories of chemicals.

### **4. Who reports to the North American PRTRs?**

The PRTR data are specific for an individual facility, thus the location and industry sector of the source is known. However, reporting is limited by size of facility (number of employees) and amount of substance manufactured or used on-site. Industrial sectors covered in the combined North American databases include:

- manufacturing facilities,
- electric utilities,
- hazardous waste management facilities,
- solvent recovery facilities,
- chemical wholesale distributors and
- coal mines.

Additional industrial sources may be covered in each country's database. Individual national PRTRs also may cover additional chemicals and types of data. For example, the US TRI covers metal mining (including waste rock) while the Canadian NPRI exempts metal mining but covers almost all other types of industrial activity.

### **5. What can PRTR data tell us about SMOC chemicals?**

PRTR data can provide information on annual releases of most of the chemicals covered in the NARAPs, as shown in Table 1.

### **Mercury**

For example, mercury, for which a NARAP is being implemented under SMOC, has been reported to both the US and Canadian PRTRs since their beginnings. For the latest reporting year (2000), the reporting threshold for mercury was lowered which means that additional sources are now reporting to the PRTRs. The reporting threshold for mercury and its compounds is 5 kg for NPRI and 4.5 kg for TRI manufactured, processed or otherwise used. Mercury is also on the RETC list but the reporting threshold is not comparable (facilities report mercury if they release on-site 1 kg or more). Table 2 shows the amount of mercury released and transferred in 2000. PRTR data can tell you which industrial sectors reported releases and transfers of mercury and its compounds. Table 3 shows how much mercury was released on- and off-site by each industrial sector in 2000.

In addition to industrial sectors, individual facilities that contribute to the releases and transfers of the chemicals can be located. Table 4 shows the five facilities in each country that reported the largest total releases on- and off-site in 2000. Other analysis based on the geographic location of the facilities can identify particular hot spots for chemical releases.

Since reporting is required on an annual basis, trends can be measured from the base year (which is 1995 for the combined North American data), as shown in Table 5. Since reporting was expanded for 2000, only data from 1995-1999 can be compared. Such analysis shows that, while on-site releases from the facilities to water, underground injection and off-site disposal have been decreasing, air emissions and land disposal on-site have been increasing.

### **Dioxins/Furans and Hexachlorobenzene**

Reporting on dioxins/furans was added and reporting on hexachlorobenzene was expanded in the US and Canadian PRTRs for the 2000 reporting year. The method of reporting is different in the two countries. The Canadian NPRI requires dioxin/furans to be reported as total grams of TEQ for 17 congeners while the US TRI requires them to be reported as total grams along with a distribution for the 17 congeners. Also, the Canadian NPRI has a selected list of industries that must report dioxins/furans and hexachlorobenzene, but for those industries there is no lower threshold below which reporting is not required. For the US TRI, all industry sectors that are covered by TRI are required to report on dioxins/furans if they "use" (i.e. dioxins/furans are present as by-products, etc.) more than 0.1 grams. For hexachlorobenzene, facilities must report if they use more than 10 pounds (4.5 kg).

The RETC list also has dioxins/furans and hexachlorobenzene. However, the reporting thresholds are different from both NPRI and TRI. Mexican industries covered by the RETC are asked to voluntarily report on dioxins/furans if they release on-site any amount and on hexachlorobenzene if the release on-site 1,000 kg or more.

Table 6 and Table 7 present the data on total releases on- and off-site as reported for 2000 for dioxins/furans in the two countries. In Table 7, the international toxic equivalency factors have been applied according to the distribution reported to TRI. These are the same TEFs that underlie the Canadian NPRI reporting on dioxins/furans. More industry sectors must report to NPRI so that there are more industry sectors that are "unmatched" in the NPRI

data. In particular, municipal incinerators (under US SIC code 95, Air, Water and Solid Waste Management) are included in NPRI. There are 35 municipal incinerators in Newfoundland that reported a total of over 50 grams-TEQ of dioxins/furans in 2000 to NPRI.

Tables 8 and 9 present the data on total releases on- and off-site by industry as reported for 2000 for hexachlorobenzene in the two countries.

Additional data for dioxins/furans are collected in each PRTR. In NPRI, facilities report the reasons the dioxins/furans are present. For example, a facility must indicate if it incinerates hazardous, non-hazardous or biomedical waste or sewage sludge, if it smelts base metals, scrap containing lead or aluminum, produces Portland cement, combusts fossil fuel in a boiler unit to produce electricity, or combusts salt-laden logs in the pulp and paper sector, among others. TRI includes the percentage distribution for each of the 17 dioxin/furan congeners in its total releases (or, if not known, for its largest release stream) in addition to reporting on total grams. Such data can be used to calculate the TEQ using a selected system of toxic equivalent factors.

### **Lead**

Lead, a substance under consideration for action under SMOC, is reported in both the US and Canadian PRTRs. Table 10 shows the amount of lead released and transferred in the reporting year 2000 and Table 11 shows how much lead was released on- and off-site by each industrial sector in 2000. Table 12 shows the five facilities in each country that reported the largest total releases on- and off-site in 2000.

Reporting to the PRTR has been changed to include more industrial sectors and additional chemicals over the years. Therefore, the trend data are a subset of the current database that includes only sectors and chemicals reportable in all years being analyzed. In the case of lead, which has been reportable since the beginning of both NPRI and TRI, only manufacturing facilities are included in a trend report with a 1995 baseline since only such industry sectors reported in 1995 (additional sectors were added to TRI reporting in 1998). Trends from 1995-2000 for releases of lead are shown in Table 13. This table shows that, while on-site releases to air and water from the facilities have been decreasing, land disposal (on- and off-site) have been increasing.

### **Chlordane**

The implementation of the NARAP on chlordane is deemed a success story: chlordane now is no longer registered for use in Canada, Mexico or the United States and is no longer manufactured in North America. The NARAP brought high-level public and governmental attention to the chlordane issue. Mexico has cancelled the registration of chlordane and the US ceased manufacture in 1997. The gradual restriction of permitted uses of chlordane was made possible by the availability of alternatives that are safer, effective and less persistent. The phased reduction was also important, in that it helped avoid the creation of a large-scale disposal problem.

Only the US TRI included chlordane on its list of toxic chemicals. However, releases and transfers of chlordane from manufacturing facilities have been reported since 1988. For the 1998 reporting year, reporting has also been required from hazardous waste management facilities. In 2000, the threshold for reporting chlordane was lowered from 10,000 pounds to 10 pounds per year of manufacture/process or other uses. As Table 14 shows, releases



from the manufacture of chlordane had dropped to zero by 1997. As Table 15 and Table 16 show, hazardous waste disposal of chlordane does continue in the US.

## 6. What are the possible linkages between PRTR-SMOC?

PRTR data are available on many categories of substances including:

- Solvents
- Metals
- Developmental toxins
- Neurotoxins
- Ozone depleters
- Carcinogens
- Selected persistent bioaccumulative toxics (PBTs)
- Endocrine disruptors
- Respiratory toxins

Thus, PRTR data could be used as one source of information for identifying priorities for action to reduce the generation of and exposures to individual chemicals or groups of chemicals.

Other examples of possible linkages include using PRTR data to:

- benchmark progress for SMOC NARAPs
- indicate where new activities may be needed to accomplish NARAP goals
- help identify new chemicals for NARAPs
- help assemble chemical inventories needed for NARAPs
- be an input into fate and transport modeling required in NARAPs
- identify production processes resulting in releases of SMOC chemicals
- identify potential pollution prevention practices to reduce releases of SMOC chemicals, drawing on information reported by facilities to PRTRs
- help communicate the environmental concerns of SMOC chemicals by noting where and what types of releases occur
- identify opportunities for an industry challenge program to reduce releases/transfers of selected chemicals<sup>1</sup>

SMOC activities could also help to improve PRTR data availability, comparability and use.

Possible linkages include:

- use of SMOC chemical inventories to help guide PRTR reporting
- identification of additional sectors or substances that should be considered for PRTR reporting
- promote comparable reporting thresholds for SMOC chemicals, in order to improve continent-wide data
- consider using SMOC public information materials on steps being taken to reduce releases of chemicals in PRTR reports

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<sup>1</sup> The CEC Council Resolution 02-05 on the Action Plan to Enhance Comparability Among Pollutant Release and Transfer Registers in North America "calls upon the three parties, through their national PRTR programs, to explore ways of fostering reductions by industries across North America in the release and transfer of substances of common concern, possibly including a trilateral challenge program that would build on the experiences of the successful United States 33/50 program, the Canadian Accelerated Reduction/Elimination of Toxics, and other similar programs."

## **7. Areas for discussion**

CEC is interested in identifying opportunities for strengthening synergies and linkages between the SMOC and PRTR programs, with a view to improving pollution prevention and sound management of toxic chemicals. The following topics are presented as a starting point for discussion.

### **Mercury**

- 1) Each of the three countries has a national mercury inventory. The NARAP has been developed using these inventories. In addition, the PRTRs collect data on annual releases and transfers of mercury from industrial sources. These data are available for Canada since 1995 and the US since 1998. Mexico will collect such data starting in 2003. How might annual PRTR data be used to complement the inventory data? What other linkages with PRTR could help in implementing the SMOC NARAP on mercury?
- 2) The CEC Article 13 report on the electricity sector includes estimates of mercury emissions. The US and Canadian PRTRs also include releases of mercury from the electricity sector. How can these two projects be coordinated? What could be the role of PRTR data in tracking these releases over time?
- 3) Other ideas or suggestions from participants.

### **Dioxins/furans and Hexachlorobenzene**

- 1) Each of the three countries has a national dioxins/furans inventory. The NARAP is being developed using these inventories. In addition, the PRTRs collect data on annual releases and transfers of dioxins/furans and hexachlorobenzene from industrial sources. These data are available for Canada and the US since 2000. Mexico will collect such data starting in 2003. What types of linkages can be made in developing the SMOC NARAP on dioxins/furans and hexachlorobenzene?
- 2) How could the PRTR data be used to track progress and identify possible areas for action to reduce dioxins/furans and hexachlorobenzene?
- 3) Other ideas or suggestions from participants.

### **Other Opportunities for SMOC-PRTR Collaboration**

- 1) PRTRs cover several hundred chemicals and many chemicals that are similar in nature or function. For example, chemicals on the PRTR lists can be grouped according to their health effects such as carcinogens, reproductive toxins or endocrine disruptors. Or, the chemicals of concern on the lists can be grouped according to their uses, such as solvents. Are there strategies under the SMOC program that could be developed for addressing groups of chemicals of concern using the PRTR data?
- 2) Comparable PRTR data will soon be available in all three countries. How could these data be used to identify potential areas for trilateral action of the types identified in the current SMOC NARAPs?

- 3) The SMOC program has developed a successful strategy for identifying trilateral actions focused on reductions of releases of individual chemicals. The PRTR systems provide comprehensive comparable data on the releases of a wide variety of chemicals of concern from industrial sources. What ideas do you have for a proposed trilateral challenge program to foster reductions by industries across North America in the release and transfers of substances of common concern?
- 4) Other ideas or suggestions from participants.

**Table 1. SMOC Substances reporting under Mexico, US and Canadian chemical reporting**

<b>SMOC Substance</b>	<b>Mexico reporting RETC (voluntary until 2003 Reporting Year)*</b>	<b>US PRTR Reporting Toxic Release Inventory (TRI)*</b>	<b>Canada PRTR Reporting National Pollutant Release Inventory NPRI)*</b>
DDT	Yes	No	No
Chlordane	Yes	Yes – starting with year 1988 – as of 2000 more sources covered due to lowered reporting threshold	No
PCB	Yes	Yes – starting with year 1988 – as of 2000 more sources covered due to lowered reporting threshold	No
Mercury	Yes – inorganic compounds and elemental form	Yes – starting with year 1988 – as of 2000 more sources covered due to lowered reporting threshold	Yes – starting with year 1995 – as of 2000 more sources covered due to lowered reporting threshold
Dioxins/furans	Yes – 2 congeners	Yes – 17 congeners starting with year 2000	Yes – 17 congeners starting with year 2000, reported as TEQ
Lindane	Yes	Yes – starting with year 1988	No
Lead	Yes	Yes – starting with year 1988 – as of 2001 more sources covered due to lowered reporting threshold	Yes – starting with year 1995 – as of 2002 more sources covered due to lowered reporting threshold

\* NPRI/TRI reporting thresholds are based on amount of activity/use. RETC reporting thresholds are based on amount of on-site releases, which are not comparable to NPRI/TRI thresholds.

**Table 2. Summary of total reported amounts of releases and transfers of Mercury and its compounds, 2000 matched data (2000 Matched Industries)**

	<u>North America</u> (kg)	<u>Canadian NPRI</u> (kg)	<u>United States TRI</u> (kg)
<i>Total On-site Releases*</i>	151,870	8,372	143,498
Air	74,150	5,510	68,640
Surface Water	1,103	67	1,037
Underground Injection	1,090	26	1,064
Land	75,527	2,770	72,757
<i>Total Off-site Releases</i>	432,870	25,495	407,375
<i>Total Releases On- and Off-site</i>	584,740	33,867	550,873
<i>Transfers to Recycling</i>	113,616	30,546	83,070
<i>Other Transfers Off-site for Further Management</i>	0	0	0
<b>Total Reported Amounts of Releases and Transfers</b>	698,356	64,413	633,943

Note: Canada and US data only. Mexico data not available for 2000. Data include chemicals common to both NPRI and TRI lists from selected industrial and other sources. The data reflect estimates of releases and transfers of chemicals, not exposures of the public to those chemicals. The data, in combination with other information, can be used as a starting point in evaluating exposures that may result from releases and other management activities which involve these chemicals.

\* The sum of air, surface water, underground injection and land releases in NPRI does not equal the total on-site releases because in NPRI on-site releases of less than 1 tonne may be reported as an aggregate amount.

**Table 3. Total Releases for Mercury and its compounds, 2000 matched data set**

US SIC Code Industry	Total Releases On- and Off-site		
	North America kg	Canadian NPRI kg	US TRI kg
12 Coal Mining	2,940	0	2,940
20 Food Products	386	15	371
21 Tobacco Products	102	0	102
22 Textile Mill Products	107	0	107
24 Lumber and Wood Products	81	0	81
26 Paper Products	2,808	360	2,448
27 Printing and Publishing	36	0	36
28 Chemicals	30,062	7,517	22,544
29 Petroleum and Coal Products	5,490	21	5,469
30 Rubber and Plastics Products	78	0	78
32 Stone/Clay/Glass Products	7,076	265	6,811
33 Primary Metals	53,360	11,250	42,110
34 Fabricated Metals Products	586	560	26
35 Industrial Machinery	32	1	32
36 Electronic/Electrical Equipment	3,715	818	2,898
37 Transportation Equipment	157	0	157
38 Measurement/Photographic Instruments	708	0	708
39 Misc. Manufacturing Industries	3	0	3
491/493 Electric Utilities	75,548	3,037	72,511
5169 Chemical Wholesalers	0	0	0
495/738 Hazardous Waste Mgt./Solvent Recovery	389,623	10,024	379,598
-- Multiple codes 20-39*	11,843	0	11,843
Total	584,740	33,867	550,873

Note: Canada and US data only. Mexico data not available for 2000. Data include chemicals common to both NPRI and TRI lists from selected industrial and other sources. The data reflect estimates of releases and transfers of chemicals, not exposures of the public to those chemicals. The data, in combination with other information, can be used as a starting point in evaluating exposures that may result from releases and other management activities which involve these chemicals.

\* Multiple codes reported only in TRI.

**Table 4. Facilities with Largest Total Releases On- and Off-site of Mercury and its Compounds, 2000 matched data set**

<b>Facility</b>	<b>City, State/Province</b>	<b>Industry Sector</b>	<b>Total Releases On- and Off-site kg</b>
<b><u>Canada</u></b>			
Ivaco Rolling Mills	L'Orignal, ON	Primary Metals	6,069
Services Safety-Kleen (Québec) Ltée, Centre de transfert de Thurso	Thurso, QC	Hazardous Waste Management	4,372
Nexen Inc., Squamish	Squamish, BC	Chemicals	3,806
Noranda Inc. CEZinc, Usine d'extraction de Zinc	Valleyfield, QC	Primary Metals	2,759
Safety-Kleen Ltd., Lambton Facility	Corunna, ON	Chemicals	2,107
<b><u>United States</u></b>			
Waste Management Inc.	Port Arthur, TX	Hazardous Waste Management	261,946
Clean Harbors of Braintree Inc., Clean Harbors Inc.	Braintree, MA	Hazardous Waste Management	26,532
Zinc Corp. of America Monaca Smelter, Horsehead Inds. Inc.	Monaca, PA	Primary Metals	24,594
Clean Harbors Services Inc., Clean Harbors Inc.	Chicago, IL	Hazardous Waste Management	20,634
Chemical Waste Management, Waste Management Inc.	Emelle, AL	Hazardous Waste Management	15,347

**Table 5. Summary of total releases of Mercury and its compounds, 1995-1999 matched data set**

	North America						
	1995 (kg)	1996 (kg)	1997 (kg)	1998 (kg)	1999 (kg)	Change (kg)	1995-1999 Percent
<i>Total On-site Releases*</i>	8,104	8,331	7,501	9,924	11,364	3,260	40
Air	7,472	7,828	6,637	7,223	7,576	104	1
Surface Water	155	253	195	136	95	-59	-38
Underground Injection	3	4	19	0	0	-3	-100
Land	473	244	645	2,548	3,682	3,209	679
<i>Off-site Releases (Transfers to Disposal)</i>	119,633	28,868	26,975	21,040	36,624	-83,009	-69
<b>Total Releases On- and Off-site</b>	<b>127,737</b>	<b>37,200</b>	<b>34,476</b>	<b>30,964</b>	<b>47,988</b>	<b>-79,749</b>	<b>-62</b>
	Canadian NPRI						
	1995 (kg)	1996 (kg)	1997 (kg)	1998 (kg)	1999 (kg)	Change (kg)	1995-1999 Percent
<i>On-site Releases*</i>	46	37	244	514	1,540	1,494	3,248
Air	26	27	52	437	1,510	1,484	5,708
Surface Water	6	8	2	60	20	14	233
Underground Injection	0	0	0	0	0	0	--
Land	12	0	184	0	0	-12	-100
<i>Off-site Releases (Transfers to Disposal)</i>	19,259	9,617	3,486	4,904	9,676	-9,583	-50
<b>Total Releases On- and Off-site</b>	<b>19,305</b>	<b>9,654</b>	<b>3,730</b>	<b>5,418</b>	<b>11,216</b>	<b>1,306</b>	<b>39</b>
	United States TRI						
	1995 (kg)	1996 (kg)	1997 (kg)	1998 (kg)	1999 (kg)	Change (kg)	1995-1999 Percent
<i>On-site Releases*</i>	8,058	8,294	7,257	9,410	9,824	1,766	22
Air	7,446	7,801	6,585	6,786	6,066	-1,380	-19
Surface Water	149	245	193	76	75	-73	-49
Underground Injection	3	4	19	0	0	-3	-100
Land	461	244	461	2,548	3,682	3,221	699
<i>Off-site Releases (Transfers to Disposal)</i>	100,374	19,251	23,489	16,136	26,948	-73,426	-73
<b>Total Releases On- and Off-site</b>	<b>108,432</b>	<b>27,546</b>	<b>30,746</b>	<b>25,546</b>	<b>36,772</b>	<b>-71,660</b>	<b>-66</b>

Note: Canada and US data only. Mexico data not available for 1995-1999. Data include chemicals common to both NPRI and TRI lists from selected industrial and other sources. The data reflect estimates of releases and transfers of chemicals, not exposures of the public to those chemicals. The data, in combination with other information, can be used

\* The sum of air, surface water, underground injection and land releases in NPRI does not equal the total on-site releases because in NPRI on-site releases of less than 1 tonne may be reported as an aggregate amount.



**Table 6. Total Releases On- and Off-site of Dioxins/Furans by Industry, NPRI, 2000**  
(2000 All Chemicals and Industries)

<b>US SIC Code</b>	<b>Industry</b>	<b>Number of Forms</b>	<b>Total Reported Releases On-site and Off-site (grams TEQ)</b>
<b><u>Matched Industries</u></b>			
26	Paper Products	51	129.03
33	Primary Metals	48	117.49
28	Chemicals	9	36.10
491/493	Electric Utilities	33	10.69
73	Hazardous Waste Mgt./Solvent Recovery	6	6.33
24	Lumber and Wood Products	64	4.59
32	Stone/Clay/Glass Products	14	1.85
34	Fabricated Metal Products	3	0.05
20	Food Products	1	0.00
35	Industrial Machinery	1	0.00
36	Electronic/Electrical Equipment	1	0.00
37	Transportation Equipment	2	0.00
39	Misc. Manufacturing	2	0.00
<b>Subtotal</b>		<b>235</b>	<b>306.13</b>
<b><u>Not Matched Industries</u></b>			
95	Air, Water, & Solid Waste Management	41	50.98
49	Electric, Gas, Sanitary Services	7	1.91
50	Wholesale Durable Goods	1	0.04
08	Forestry Products	1	0.01
10	Metal Mining	5	0.01
09	Fishing, Hunting, Trapping	1	0.00
13	Oil and Gas Exploration	2	0.00
14	Nonmetallic Minerals Mining	1	0.00
47	Transportation Services	1	0.00
80	Health and Allied Services	2	0.00
<b>Subtotal</b>		<b>62</b>	<b>52.95</b>
<b>Total</b>		<b>297</b>	<b>359.08</b>

**Table 7. Total Releases On-site and Off-site of Dioxin/Furans in Grams TEQ, TRI, 2000**  
(2000 All Chemicals and Industries)

US SIC Code Industry	All Forms Reporting Dioxins/Furans		Forms Reporting Dioxin/Furan Distribution			
	Total Releases On-site and Off- site in Grams		Total Releases On-site and Off-site in Grams		Total Releases On-site and Off-site in i-TEQ Grams*	
	Number of Forms	grams	Number of Forms	grams	Number of Forms	grams TEQ
<b><u>Matched Industries</u></b>						
28 Chemicals	136	89,134.54	95	87,864.43	95	682.49
33 Primary Metals	110	4,309.90	79	4,168.30	79	214.46
491/493 Electric Utilities	466	2,039.70	307	1,577.99	307	111.65
32 Stone/Clay/Glass Products	113	506.55	53	293.26	53	39.86
26 Paper Products	164	491.07	140	376.89	140	14.15
-- Multiple codes 20-39**	43	1,254.98	29	1,169.70	29	13.50
495/738 Hazardous Waste Mgt./Solvent Recovery	16	776.08	10	73.69	10	12.03
29 Petroleum and Coal Products	58	52.23	21	33.21	21	2.12
24 Lumber and Wood Products	103	1,116.02	65	1,087.79	65	1.98
20 Food Products	24	19.24	16	8.41	16	0.42
38 Measurement/Photographic Instruments	1	5.54	1	5.54	1	0.18
37 Transportation Equipment	5	1.61	2	1.19	2	0.10
34 Fabricated Metals Products	1	0.82	1	0.82	1	0.03
35 Industrial Machinery	2	12.64	ND	ND	ND	ND
12 Coal Mining	1	5.67	ND	ND	ND	ND
25 Furniture and Fixtures	2	3.11	ND	ND	ND	ND
36 Electronic/Electrical Equipment	1	1.00	ND	ND	ND	ND
30 Rubber and Plastics Products	2	0.94	ND	ND	ND	ND
21 Tobacco Products	2	0.45	ND	ND	ND	ND
22 Textile Mill Products	1	0.12	ND	ND	ND	ND
<b>Subtotal</b>	<b>1,251</b>	<b>99,732.21</b>	<b>819</b>	<b>96,661.24</b>	<b>819</b>	<b>1,092.99</b>
<b><u>Not Matched Industries</u></b>						
57 Petroleum Bulk Terminals	2	102.80	1	102.80	1	2.69
10 Metal Mining	10	16.79	9	16.09	9	2.08
-- No codes 20-39	11	4.99	2	0.95	2	0.05
<b>Subtotal</b>	<b>23</b>	<b>124.58</b>	<b>12</b>	<b>119.84</b>	<b>12</b>	<b>4.82</b>
<b>Total</b>	<b>1,274</b>	<b>99,856.78</b>	<b>831</b>	<b>96,781.08</b>	<b>831</b>	<b>1,097.81</b>

\* i-TEQ based on toxic equivalency factors developed by international convention adopted in 1989.

\*\* Multiple codes reported only in TRI.

**Table 8. Total Releases On- and Off-site of Hexachlorobenzene by Industry, NPRI, 2000**  
(2000 All Chemicals and Industries)

<b>US SIC Code</b>	<b>Industry</b>	<b>Number of Forms</b>	<b>Total Reported Releases On-site and Off-site (grams)</b>
<b><u>Matched Industries</u></b>			
491/493	Electric Utilities	33	18,755.95
33	Primary Metals	48	3,386.95
32	Stone/Clay/Glass Products	14	2,088.97
495/738	Hazardous Waste Mgt./Solvent Recovery	6	1,275.49
37	Transportation Equipment	2	511.00
28	Chemicals	9	361.24
26	Paper Products	51	294.02
24	Lumber and Wood Products	64	243.32
36	Electronic/Electrical Equipment	1	47.00
39	Misc. Manufacturing Industries	2	34.00
34	Fabricated Metals Products	3	29.00
20	Food Products	1	0.00
35	Industrial Machinery	1	0.00
	<b>Subtotal</b>	<b>235</b>	<b>27,026.94</b>
<b><u>Not Matched Industries</u></b>			
49	Electric, Gas, Sanitary Services	7	8,043.57
95	Air, Water and Solid Waste Management	41	2,523.60
50	Wholesale Durable Goods	1	424.56
47	Transportation Services	1	11.40
80	Health and Allied Services	2	2.97
09	Fishing, Hunting, Trapping	1	2.93
13	Oil and Gas Extraction	2	1.64
10	Metal Mining	5	0.76
08	Forestry Products	1	0.00
14	Nonmetallic Minerals Mining	1	0.00
	<b>Subtotal</b>	<b>62</b>	<b>11,011.43</b>
	<b>Total</b>	<b>297</b>	<b>38,038.37</b>

**Table 9. Total Releases On- and Off-site of Hexachlorobenzene by Industry, TRI, 2000**  
(2000 All Chemicals and Industries)

<b>US SIC Code</b>	<b>Industry</b>	<b>Number of Forms</b>	<b>Total Reported Releases On-site and Off-site (grams)</b>
<b><u>Matched Industries</u></b>			
28	Chemicals	36	9,178.19
495/738	Hazardous Waste Mgt./Solvent Recovery	18	7,769.72
491/493	Electric Utilities	8	4,406.19
33	Primary Metals	6	402.18
30	Rubber and Plastics Products	3	160.82
	-- Multiple codes 20-39*	2	6.80
32	Stone/Clay/Glass Products	2	0.50
24	Lumber and Wood Products	23	0.00
	<b>Subtotal</b>	<b>98</b>	<b>21,924.40</b>
<b><u>Not Matched Industries</u></b>			
	-- No codes 20-39	2	32.20
	<b>Subtotal</b>	<b>2</b>	<b>32.20</b>
	<b>Total</b>	<b>100</b>	<b>21,956.60</b>

\* Multiple codes reported only in TRI.

**Table 10. Summary of total reported amounts of releases and transfers of Lead and its compounds, 2000 matched data set**

	<u>North America</u> (tonnes)	<u>Canadian NPRI</u> (tonnes)	<u>United States TRI</u> (tonnes)
<i>Total On-site Releases*</i>	22,540	3,640	18,900
Air	1,058	468	590
Surface Water	45	5	39
Underground Injection	124	0	124
Land	21,310	3,163	18,147
<i>Total Off-site Releases (Transfers to Disposal)</i>	22,674	1,528	21,146
<i>Total Releases On- and Off-site</i>	45,214	5,168	40,046
<i>Transfers to Recycling</i>	127,336	12,741	114,595
<i>Other Transfers Off-site for Further Management</i>	0	0	0
<b>Total Reported Amounts of Releases and Transfers</b>	<b>172,550</b>	<b>17,908</b>	<b>154,642</b>

Note: Canada and US data only. Mexico data not available for 2000. Data include chemicals common to both NPRI and TRI lists from selected industrial and other sources. The data reflect estimates of releases and transfers of chemicals, not exposures of the public to those chemicals. The data, in combination with other information, can be used as a starting point in evaluating exposures that may result from releases and other management activities which involve these chemicals.

\* The sum of air, surface water, underground injection and land releases in NPRI does not equal the total on-site releases because in NPRI on-site releases of less than 1 tonne may be reported as an aggregate amount.

**Table 11. Total Releases for Lead and its compounds by Industry Sector, 2000 matched data set**

US SIC Code Industry	Total Releases On- and Off-site		
	North America tonnes	NPRI tonnes	TRI tonnes
33 Primary Metals	18,023	1,839	16,184
495/738 Hazardous Waste Mgt./Solvent Recovery	11,839	374	11,465
36 Electronic/Electrical Equipment	5,317	28	5,290
28 Chemicals	3,887	2,675	1,212
491/493 Electric Utilities	3,353	157	3,196
32 Stone/Clay/Glass Products	1,205	3	1,202
-- Multiple codes 20-39*	598	0	598
34 Fabricated Metals Products	460	3	457
12 Coal Mining	162	0	162
30 Rubber and Plastics Products	106	44	62
37 Transportation Equipment	105	5	99
26 Paper Products	55	0	55
39 Misc. Manufacturing Industries	38	36	2
29 Petroleum and Coal Products	22	2	20
35 Industrial Machinery	17	2	16
25 Furniture and Fixtures	12	0	12
22 Textile Mill Products	10	0	10
24 Lumber and Wood Products	2	0	2
38 Measurement/Photographic Instruments	2	0	2
27 Printing and Publishing	0	0	0
31 Leather Products	0	0	0
5169 Chemical Wholesalers	0	0	0
Total	45,214	5,168	40,046

Note: Canada and US data only. Mexico data not available for 2000. Data include chemicals common to both NPRI and TRI lists from selected industrial and other sources. The data reflect estimates of releases and transfers of chemicals, not exposures of the public to those chemicals. The data, in combination with other information, can be used as a starting point in evaluating exposures that may result from releases and other management activities which involve these chemicals.

\* Multiple codes reported only in TRI.

**Table 12. Facilities with Largest Total Releases On- and Off-site of Lead and its Compounds, 2000 matched data set**

<b>Facility</b>	<b>City, State/Province</b>	<b>Industry Sector</b>	<b>Total Releases On- and Off-site tonnes</b>
<b><u>Canada</u></b>			
Safety-Kleen Ltd., Lambton Facility	Corunna, ON	Chemicals	2,662
Noranda Inc, Brunswick Smelter	Belledune, NB	Primary Metals	300
Hudson Bay Mining and Smelting Company Ltd., HBM&S Co., Ltd., Anglo American PLC	Flin Flon, MB	Primary Metals	167
Safety-Kleen Ltd., Safety-Kleen (Niagara) Ltd.	Thorold, ON	Hazardous Waste Management	148
Dofasco Inc., Dofasco Hamilton	Hamilton, ON	Primary Metals	145
<b><u>United States</u></b>			
Exide Corp.	Bristol, TN	Electrical/ Electronic Equipment	4,274
US Ecology Idaho Inc., American Ecology Corp.	Grand View, ID	Hazardous Waste Management	2,273
ASARCO Inc.	East Helena, MT	Primary Metals	2,114
Kennecott Utah Copper Smelter & Refy., Kennecott Holdings Corp.	Magna, UT	Primary Metals	1,794
Chemical Waste Management Inc., Waste Management Inc.	Kettleman City, CA	Hazardous Waste Management	1,439

**Table 13. Summary of total releases of Lead and its compounds, 1995-2000 matched data set**

	North America							
	1995 (tonnes)	1996 (tonnes)	1997 (tonnes)	1998 (tonnes)	1999 (tonnes)	2000 (tonnes)	Change 1995-2000 (tonnes)	Percent
<i>Total On-site Releases*</i>	9,440	9,131	10,705	10,758	11,742	10,171	731	8
Air	1,384	1,322	1,110	1,039	964	988	-397	-29
Surface Water	48	35	29	36	26	28	-19	-41
Underground Injection	83	303	120	82	83	98	14	17
Land	7,919	7,465	9,441	9,597	10,665	9,054	1,135	14
<i>Off-site Releases (Transfers to Disposal)</i>	14,034	14,468	20,932	18,825	16,318	19,722	5,688	41
<b>Total Releases On- and Off-site</b>	<b>23,474</b>	<b>23,599</b>	<b>31,637</b>	<b>29,582</b>	<b>28,060</b>	<b>29,893</b>	<b>6,419</b>	<b>27</b>
	Canadian NPRI							
	1995 (tonnes)	1996 (tonnes)	1997 (tonnes)	1998 (tonnes)	1999 (tonnes)	2000 (tonnes)	Change 1995-2000 (tonnes)	Percent
<i>On-site Releases*</i>	1,346	1,393	1,251	1,225	3,250	3,494	2,148	160
Air	526	561	547	514	443	467	-58	-11
Surface Water	19	6	5	12	8	5	-13	-72
Underground Injection	0	0	0	0	0	0	0	-93
Land	796	821	694	694	2,795	3,018	2,222	279
<i>Off-site Releases (Transfers to Disposal)</i>	2,019	2,265	2,917	2,136	1,371	1,177	-842	-42
<b>Total Releases On- and Off-site</b>	<b>3,364</b>	<b>3,658</b>	<b>4,168</b>	<b>3,362</b>	<b>4,620</b>	<b>4,670</b>	<b>1,306</b>	<b>39</b>
	United States TRI							
	1995 (tonnes)	1996 (tonnes)	1997 (tonnes)	1998 (tonnes)	1999 (tonnes)	2000 (tonnes)	Change 1995-2000 (tonnes)	Percent
<i>On-site Releases*</i>	8,094	7,738	9,454	9,532	8,492	6,677	-1,417	-18
Air	859	761	563	525	522	520	-338	-39
Surface Water	29	29	23	23	18	23	-6	-21
Underground Injection	83	303	120	82	83	98	14	17
Land	7,123	6,645	8,747	8,903	7,870	6,036	-1,087	-15
<i>Off-site Releases (Transfers to Disposal)</i>	12,015	12,202	18,014	16,688	14,947	18,546	6,530	54
<b>Total Releases On- and Off-site</b>	<b>20,110</b>	<b>19,940</b>	<b>27,468</b>	<b>26,221</b>	<b>23,439</b>	<b>25,223</b>	<b>5,113</b>	<b>25</b>

Note: Canada and US data only. Mexico data not available for 1995-2000. Data include chemicals common to both NPRI and TRI lists from selected industrial and other sources. The data reflect estimates of releases and transfers of chemicals, not exposures of the public to those chemicals. The data, in combination with other information, can be used as a starting point in evaluating

\* The sum of air, surface water, underground injection and land releases in NPRI does not equal the total on-site releases because in NPRI on-site releases of less than 1 tonne may be reported as an aggregate amount.



**Table 14. Summary of releases and transfers of chlordane by TRI Facilities, 1988-1997**

<b>Year</b>	<b>1988</b>	<b>1989</b>	<b>1990</b>	<b>1991</b>	<b>1992</b>	<b>1993</b>	<b>1994</b>	<b>1995</b>	<b>1996</b>	<b>1997</b>
	<b>Number</b>	<b>Number</b>	<b>Number</b>	<b>Number</b>	<b>Number</b>	<b>Number</b>	<b>Number</b>	<b>Number</b>	<b>Number</b>	<b>Number</b>
Total Facilities	2	2	2	3	2	1	1	1	1	0
	<b>kg</b>	<b>kg</b>	<b>kg</b>	<b>kg</b>	<b>kg</b>	<b>kg</b>	<b>kg</b>	<b>kg</b>	<b>kg</b>	<b>kg</b>
<i>Total On-site Releases</i>	3,158	1,704	2,006	648	777	30	595	383	342	0
Total Air Emissions	1,224	1,702	2,005	647	777	23	590	373	299	0
Surface Water Discharges	2	2	0	0	0	7	6	10	43	0
Underground Injection	1,933	0	0	0	0	0	0	0	0	0
On-site Land Releases	0	0	0	0	0	0	0	0	0	0
<i>Total Off-site Releases (Transfers to Disposal)</i>	0	0	0	0	0	0	0	0	0	0
<i>Total On- and Off-site Releases</i>	3,158	1,704	2,006	648	777	30	595	383	342	0
<i>Total Transfers for Further Management</i>	36,659	1,422	282	164	328	28	48	43	38	0
Transfers to Treatment	33,637	1,405	237	132	289	5	3	0	0	0
Transfers to POTWs	10	17	45	31	39	23	45	43	38	0
Other Off-site Transfers	3,011	0	0	0	0	0	0	0	0	0
<b>Total Releases and Transfers</b>	<b>39,817</b>	<b>3,126</b>	<b>2,288</b>	<b>811</b>	<b>1,106</b>	<b>58</b>	<b>644</b>	<b>426</b>	<b>380</b>	<b>0</b>

Note: Includes manufacturing industries only.

**Table 15. Total Waste Management On- and Off-site of Chlordane by TRI Facilities, 1998-1999**

<b>Year</b>	<b>1998 Number</b>	<b>1999 Number</b>
Total Facilities	7	4
	<b>kg</b>	<b>kg</b>
<i>Total On-site Releases</i>	20,725	4
Total Air Emissions	20	4
Surface Water Discharges	0	0
Underground Injection	9,118	0
On-site Land Releases	11,586	0
<i>Off-site Releases (Transfers to Disposal)</i>	10	18
<i>Total On- and Off-site Releases</i>	20,735	22
<i>Total Transfers for Further Management</i>	11,706	52
Transfers to Recycling	0	0
Transfers to Energy Recovery	11,690	0
Transfers to Treatment	16	52
Transfers to POTWs	0	0
Other Off-site Transfers	0	0
<i>Total Releases and Transfers</i>	44,146	126
<i>Total On-site Waste Management</i>	84,927	213,478
Recycled On-site	0	0
Energy Recovery On-site	0	0
Treated On-site	84,927	213,478
<i>Total Waste Managed On- and Off-site</i>	129,073	213,604

Note: Only hazardous waste management facilities reported 1998-1999.

**Table 16. Total Waste Management On- and Off-site of Chlordane by TRI Facilities, 2000**

<b>Year</b>	<b>2000</b>
	<b>Number</b>
Total Facilities	21
	<b>kg</b>
<i>Total On-site Releases</i>	<i>4,064</i>
Total Air Emissions	6
Surface Water Discharges	0
Underground Injection	0
On-site Land Releases	4,058
<i>Off-site Releases (Transfers to Disposal)</i>	<i>376</i>
<i>Total On- and Off-site Releases</i>	<i>4,440</i>
<i>Total Transfers for Further Management</i>	<i>2,225</i>
Transfers to Recycling	0
Transfers to Energy Recovery	0
Transfers to Treatment	2,225
Transfers to POTWs	0
Other Off-site Transfers	0
<i>Total On-site Waste Management</i>	<i>368,505</i>
Recycled On-site	0
Energy Recovery On-site	104
Treated On-site	368,400
<i>Total Waste Managed On- and Off-site</i>	<i>375,169</i>

Note: Reporting by manufacturing industries and hazardous waste management facilities at the lowered reporting threshold of 10 lbs or more manufacture/process/use during calendar year 2000.